COMPARATIVE ANALYSIS OF DECISION-MAKING PROCESSES WITH RESPECT TO US ARMAMENTS PROCUREMENT: A CASE STUDY OF THE F-16

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COMPARATIVE ANALYSIS OF DECISION-MAKING PROCESSES WITH RESPECT TO US ARMAMENTS PROCUREMENT : A CASE STUDY OF THE F-16.

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Ph.D. Thesis
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DEDICATION

For my father, Dr. Marshall M. Parks, M.D., and in loving memory of my mother, Angeline Miller Parks, M.Sc.

(i) I, MARK E. PARKS, hereby certify that this thesis which is approximately 100,000 words in length, has been written by me, that it is the record of work carried out by me and that it has not been submitted in any previous application for a higher degree.

31 March 1988 [redacted]

(ii) Ph.D. and M.Phil. (Mode A) Candidates

I was admitted as a research student under Ordinance No.12 in October 1981 and as a candidate for the degree of Ph.D. in April 1982; the higher study for which this is a record was carried out in the University of St Andrews between 1981 and 1988.

31 March 1988 [redacted]

(iii) I hereby certify that the candidate has fulfilled the conditions of the Resolutions and Regulations appropriate for the degree of Ph.D. in the University of St. Andrews and that the candidate is qualified to submit this thesis in application for that degree.

date: 31 March 1988 signature of supervisor [redacted]

ABSTRACT

The overall purpose of this thesis is to question the value of the use of models regarding decision-making as it effectively operates within the environment of US armaments procurements. For example, conceptual framework models such as bureaucratic politics, organisational outputs, incrementalism, and others are far too simplistic in their application to this subject - they only tend to distort reality. The thesis argues that the process is far too complex with decisional centres shifting throughout the life of any one given system, thus necessitating a more realistic conceptual approach. Evidence of this is provided throughout the discussion of the organisational processes and the roles of those involved in the procurement process. Moreover, it becomes apparent that those in the highest positions of decision-making (for example, Presidents, Secretaries of Defense, etc.) are at times least likely to be involved in decisions, dependent on the stage of development of the weapon system. Further, other groups (for example, Congress, Joint Chiefs, etc.) commonly perceived as the decisional centres have little, if any involvement during the earlier stages in the life of a weapon system. The possibility of their involvement increases as the system enters what the author refers to as the hardware phase, when monies must be appropriated. In other words, the system becomes politicised and the expertise of those in higher positions becomes salient, because they are chosen for their political and managerial skills - not their expertise in detailed defence matters. Even the weight of their decisions during the hardware phase is questionable due to the fact that lower level "experts", referred to as DoD Components, with longer periods of tenure, are consistently directing upwards their appraisals of new systems requirements, threats, etc., thus setting the parameters for the higher positioned decision maker. Following the description of the organisational processes and the roles of those involved, the discussion turns to the case study of the F-16 to validate these points. The purpose is not to research a case study and then attempt to extrapolate from it axioms of weapons procurement. The exercise is intended to yield credence to the points referred to above.

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CHAPTER 1

INTRODUCTION

Research into weapons procurement methods, policies and problems as an organised academic discipline is relatively new, not only within the field of Political Science and Economics, but also within the US Department of Defense, the Executive Branch, Congress and other defence related agencies.[1] Where billions of dollars[2] are involved, research into defence procurement has generated over-simplified explanations such as military-industrial complex theories, contractors are the cause of cost overruns, or that it is a system on the verge of disorder. For example, consider the three following interpretations :

(1) "A normal thirst for more managing power within the largest management (Pentagon) in the United States gives the new state-management an unprecedented ability and opportunity for building a military-industry empire at home and for using this as an instrument for building an empire abroad. This is the new imperialism. The magnitude of the decision-power of the Pentagon management has reached that of a State. After all, the fiscal 1970 budget plan of the Department of Defense - $83 billion - exceeds the gross national product of entire nations : in billions of dollars for 1966 - Belgium $18.1; Italy $61.4; Sweden $21.2. The state-management has become a para-state, a state within a state."[3]

(2) "Large defense contractors can let costs come where they will and count on getting relief from the DoD through charges and claims, relaxations of procurement regulations and laws ... or other escape mechanisms ... They will make their money whether their product is good or bad; whether their price is fair or higher than it should be; whether delivery is on time or late."[4]

(3) "Let's face it - the fact is that there has been bad management of many defense programs in the past. We spent billions of the taxpayers' dollars; sometimes we spent it badly. Part of this is due to basic uncertainties in the defense business. However, most of it has been due to bad management, both in the Department of Defense and in the defense industry ... Frankly, gentlemen, in defense procurement, we have a real mess on our hands."[5]

These and many other criticisms, or exposes of management, regarding the decisions of weapons procurement (even though two quotations - the first from the Defense Monitor and the other from Secretary of Defense Packard - are from within the defence establishment) have blurred the decisional processes of weapons procurement. All too frequently, conventional wisdom and the literature relating to weapons procurement have related certain viewpoints to a given weapons system, and proceeded to assert that all weapons procurement decisions were the resultant of such activities which subscribe to or fit within the scope of that author's persuasion. For example, Seymor Melman, mentioned above, viewed decisions in military hardware as promoting benefits to the defence industry (para state), with the motive being profit.[6] Anthony Sampson argued that weapons procurement processes are "about the companies who make the arms, and the attitudes and methods of the men who buy them and sell them."[7] The implication throughout being that it is a business in which a "fellow has to wish for trouble so as to make a living".[8] George Thayer, set out to detail the international sales of arms. Throughout his work he made reference to "a distinct group of arms dealers", also referred to as "munitions manipulators".[9] Bloomfield and Leiss examined the lack of arms control, and the influence of the military industrial complex in limited wars. The authors reviewed profits et al, but neglected in their work to provide a basic definition of war.[10] The point here being that these authors, and others[11] like them, hold a certain outlook that neglects the consideration of essential variables such as wars. national security, Congressional Oversight Powers, foreign sales and so forth. In other words, a conception or belief is formed on the part of the author by his interpretation of the facts, which he sees fit to utilise, accounts for only a part of the process. The trap, or blurring effect, is that the observer, if convinced, tends to relate a few facts to the overall process while still failing to fully appreciate the reality or the complexity of the situation. Furthermore, it is not only opinions which cloud the decision making processes. There is a danger that the misapplication of information, in literary works, such as The Genesis of New Weapons, Decision Making for R & D, by Long and Reppy[12], leads to certain functions or relationships exhibited at a precise stage of a weapons system inadvertently being applied to other inappropriate stages. For example, applying facets of Research and Development (R & D) to Production and Deployment as well. Long and Reppy clearly stated that "more thoughtful attention needs to be paid to decisions on military R & D"[13], and an account was provided as to how contractors work within the Department of Defense to promote new technologies. The inference, herein, is that assumptions might be made that contractors interact the same way when producing arms as they do during R & D. They do not. Furthermore, another work by Cannizzo, The Gun Merchants, which detailed the politics and policies of the major arms suppliers, could also lead to the same type of misinterpretation - parallels could be drawn to the relationships of the government and contractors from sales to the DSARC III B (Defense System Acquisition Review Council) decision to enter full production.[14] Moreover, Cannizzo falls into her own trap by concluding in her opinion, that politics is the essence - "governments have their own 'midas touch': they politicise everything they touch, and arms sales have been no exception."[15]

Thus far, the insinuation has been that the observer of weapons decision making does not possess a complete framework of the US procurement practices, basing his/her knowledge on opinions, and applying specific explanations to the entire process. This is partly because weapons procurement is extremely complex both in the "magnitude and diverse sources" involved in the weapons acquisition[16], and this is due to :

> "The capacity of the human mind for formulating and solving complex problems is very small compared with the size of the problems whose solution is required for objectively rational behavior in the real world - or even for a reasonable approximation to such objective rationality."[17]

No inference is being made that man is essentially irrational. The point is that the "complexity of procurement problems ... accentuates the need for systematic procurement research."[18] Some of the aforementioned authors have done so, but they reviewed specifics or certain situations. However, the point is that the decisional processes should not be construed to be uniform throughout the entire weapons procurement process.

Thus, at the other end of the spectrum, an approach would be to attempt viewing the entire process, but the other dimension to be avoided is treating the overall defence establishment as monolithic. An excellent work which managed to take this into account, and thus is probably considered the Bible of this literary genre, is The Weapons Acquisition Process : An Economic Analysis, by Merton J Peck and Frederick M Scherer.[19] Even though they diagnosed many aspects of the military industry, they admitted that :

> "we have not examined directly or in detail the contractual and competitive incentives provided defence contractors through which the government supervises its contractors - in short, the various policy instruments through which the weapons acquisition process is directed."[20]

Even though a better approach to review the weapons procurement process might be to research the overall process itself, caution must be exercised against simplifying (for example, labels such as monolithic). Thus careful attention and research must focus not only on the progression of a weapons system through stages or phases, but the various components, their relationships to one another, and the legal or extra-legal parameters exerted upon them. To a limited degree, this has already been accomplished by other authors. However, in general the resultant has been a preoccupation with single case studies.[21] Immediately, the author herein could be accused of the same. However, the approach is not to examine the case study of the F-16 and draw conclusions of the defence industry; it is the reverse. The approach herein is that the first part of this thesis will detail the organisational structures as well as the legal and extra-legal (by precedence or tradition) parameters within which the defence planners and contractors operate. Following this, in Part II, the various roles of those concerned with defence planning and operations (for example, Secretary of Defense, Department of Defense (DoD) Component[22], _et al_) will be subject to examination by outlining the case study of the F-16. The purpose is not to review the events of the F-16 case in particular, and then extrapolate the roles and functions of the defence planners. Rather, the intention is to examine the various roles and functions of the overall defence industry, conceived or prompted by the organisational structure, and subject them to the case study of the F-16. For example, and discussed below, the DoD Components and the defence contractors work closely together throughout the acquisition process, particularly during the conception, and research and development of a weapon system. Further, the DoD Components exercise great influence in the decisional process at these stages. By examining the case of the F-16, the close interactions of the contractors and the DoD Components and their influence will be demonstrated.

Heeding Martin Edmonds' advice that "it is necessary to turn to studies of US weapons acquisition for insights into organisations, their objectives and their potential role in arms procurement"[23]; and, subsequent to Edmonds' plea, having been prompted to do so based on empirical evidence amassed from previous employment experience, the author wishes to suggest a new conceptual approach. First and foremost, the organisations and actors involved in the weapons procurement process must be identified as to their relevant functions prescribed by law or precedence. The weapons procurement process herein being defined by its stages, namely :

(1) Concept Exploration (Conception)
(2) Demonstration and Validation (Research and Development)
(3) Full Scale Development
(4) Production and Deployment [24]

From employment experience in Washington[25], the author realised that he was at times, dealing with various defence related offices as a given weapons system progressed through stages. However, whilst a given weapon system proceeded throughout the various stages (from Concept Exploration to Production and Deployment) work with a specific office would lessen or increase depending on the stage of development. In other words, a shifting of the level of influence appeared in that specific office, which either generated to it a greater influence during a given decisional stage, or that office yielding such influence to another office within the overall defence organisation. From a lobbyist's perspective, it was necessary to be aware not only of the continuing workload of that office, but also of the new actors and influences which had entered on the scene thereby creating the impression of the decisional centres to be either multiple or shifting. Initially, having entered this employment, the author approached the lobbying practice with the perceptual framework that the President, Congress, Departments of State and Defense, et al were the ultimate decisional centres. It was not long before this basic mode of thought proved to be inaccurate. These naive assumptions were quickly replaced with a systematic approach. A crucial factor regarding communications surfaced early on, as well. Communication was essential, not only with the correct people and organisations, but also, and just as importantly, contacts had to be made at precisely the correct time.

During the Concept Exploration Phase, the decisional centres and their influences appeared to remain at the lower levels (DoD Components) of the Pentagon's hierarchy, and this was also true for the most part during the Demonstration and Validation Phase. An exception to this rule occurred when large sums of money were needed for massive programmes of research and development (for example Strategic Defense Initiative Programme). If large sums were required, the trend was that the decisional centres shifted upwards (Secretary of Defense, Congress, et al). On the other hand, if smaller sums were necessary for research and development, no shifting occurred, because funds could be made available for continuing research and development of systems at the discretion of the Secretary of Defense. However, if this programme proceeded to Full Scale Development, a noticeable shift was evident. This phenomena led to the need to judge whether or not a given weapon system had entered the hardware phase with large sums appropriated by Congress, or whether it was still in a non-hardware phase. This judgment would indicate which activity was more important, as well as where it was taking place. Note that, once this shift occurred, it was not to be interpreted that the DoD Components had abdicated their influence to higher authorities. Their influence receded little, compared to those who, concerned with the political issues of funding a weapon system, experienced a sudden surge, but was eventually restored to a constant which continued throughout the implementation of its Development Phase and Production and Deployment. During these latter two phases, the amount of influence of those at the top moved up or down in a cyclical pattern. Initially, the influence would rest within the upper echelons during such times as Hearings and Budgeting of a given system. Afterwards influence receded downwards again, unless outside variables became operational. This idea is illuminated by the example of a nation requesting an arms buy, or perhaps dealing with a crisis (Yom Kippur War) in which a system's performance is tested. The issues, such as funding for a system, or the perceived threat, or cost overruns, and many other variables, publicly politicised a certain weapon system, causing the decisional centres to be shifted upwards.

As stated, the intention of this thesis is to demonstrate that varying degrees of influence are exercised by different compartments, agencies, or persons as a weapons system proceeds from conception to deployment.

Identifying the relevant organisations, and their roles, illustrates the organisational relationships and their influences. The evidence below suggests that it is highly organised, yet complex, with conflicting as well as complementary variables. Even so, from a lobbyist's perspective, by knowing the organisations and their relationships, and also who or which group(s) is involved in the process at a given stage, the number of scenarios or strategies is narrowed down, thereby lessening the uncertainties (for the contractor). Thus, if a framework as such is offered, in general, the uncertainties inherent in weapons acquisition might enjoy what Oran Young referred to as "loss minimising".[26]

Peck and Scherer stated, "uncertainty is a pervasive feature of all economic activity, and most of the uncertainties in weapons acquisition have their commercial counterparts. But there is a uniqueness in both the magnitude and the diverse sources of uncertainty in weapons acquisition."[27]

The approach adopted is to argue that the first part of this statement is correct, while the latter part is misleading. There is uniqueness in that the "procurement of arms is one of the most important and most exacting tasks performed by governments. It is the responsibility which no government, irrespective of its political complexion, can escape."[28] However, it is improper to suggest that the nature of the defence industry and the added variables of the size of the industry, the defence budget, and the millions of items procured on an annual basis, would imply an even greater increase of uncertainties. The emphasis here is to prove the contrary by viewing the organisation, and its processes, and the relationships exhibited between various groups. For example, the working relationship of a defence contractor and members of the staff of the US Air Force Research and Evaluation Team, and the culmination of the organisational processes and influences exerted by these individuals reveal that the uncertainties are essentially kept to a minimum within the overall acquisition process.

The necessity to review the organisations is heightened by the fact that the defence area of government is rather diffuse, involving much more than the Department of Defense and is certainly not the preserve of the military. Not doing so leads to over-simplification and distortion of the facts. For example, attributing President Gerald Ford with the decision to prototype the F-16 is an oversimplified statement. To take it one step further, arguing that had it not been for his decision (he did not make the decision anyway) the F-16 programme might have been doomed, is another misleading misinterpretation. The event of the decision occurred during his tenure, and as Commander-in-Chief of the Armed Forces (President Ford being ultimately accountable for military matters) the decision to prototype could, for the sake of argument have been his. However, having examined the defence related organisations, and the case of the F-16, gentlemen such as Colonel John Boyd, or US Air Force research scientist Pierre Sprey, exerted greater influence in the decisions of the F-16 programme, at particular stages, than President Ford or his predecessor President Nixon.

In addition, another reason to examine the organisations is that "processes located in the environment toward which officials direct their decisions are no less relevant than those which occur in their minds and interactions."[29] The approach herein will emphasise this, and perhaps clear some of the confusion of power, authority and influence. For example, the Secretary of Defense is in a position of authority and a DoD Component below him is cognisant of that fact. However, that DoD Component is able to exercise more power and influence for a given weapon system at certain stages (Concept Exploration, Demonstration and Validation), and may even be called upon during later stages to help influence others in a position of authority (for example, Congress). This is a result of the organisational processes a weapon system must pass through.

For an organisational process to function, aside from its structure, a decision making process must be operational. And, "the behavior of complex organisations can be regarded as determined by decisions."[30] Before turning attention to previous authors' attempts to construct a conceptual approach to decision making, there is a problem here at the outset. It would be problematic herein to attempt to choose one paradigm of decision making when there are a multiplicity of decisional centres whose influence shifts upwards or downwards. Furthermore, as stated, the overall procurement process is very complicated and "policy making should be viewed as an existential phenomenon, or phenomena cluster, much too complex and dynamic to be fully caught in concepts, models and theories."[31] Governmental realities are both more dismal and yet more promising than presented in literature below. "Social science studies from the outside do not penetrate into the realities of central high-level decision making."[32] Items such as leaked in house studies (Pentagon Papers), memoirs by insiders (Kissinger, Nixon) and writings by actors-observers (Schlesinger) reflect crucial choices better than research and data processing. It must be noted that these individuals have a limited scope of varying degrees, by their own personal prejudices. This in mind, attention will now turn to examining other accounts of decision making and the conceptual approaches employed by their authors, and the shortcomings found in applying them to the US weapons acquisition process.

A great percentage of the literature concerning decision making has been addressed within the scope of a crisis - a crisis in the sense of a progression of events occurring between the governments of two or more sovereign states, which is primarily configured by the perception of an unequivocal threat to highly held national values, and by the increased likelihood of resort to force which results in a degree of instability that is perceptibly greater than that which existed before the crisis. For example, a "kind of conflict, whether war or just maneouvring for position, is a process of bargaining - of threats and demands, proposals and counter-proposals, of giving reassurances and making trades or concessions, signalling intent and communicating the limits of one's tolerance, of getting a reputation and giving lessons."[33] Thus, the perceptions of the intentions of the opposition will play a role in the bargaining with the opposition.

Aside from perceptions, the important key is the "progression of events" which are characterised by both escalatory and de-escalatory phases during which certain other variables become especially salient.

These include the availability and adequacy of information, the finite amount of time available to make decisions, and the degree of surprise with which the decision makers are faced. Therefore, in order to successfully address the question of why a particular crisis evolved as it did, one must be armed with a conceptual understanding of the way in which decisions are reached which most closely approximates the way in which the decisions of a given crisis actually were or will be reached.

Virtually, all of the earlier models of crisis decision making and indeed of decision making in general, employ a basic assumption which underlies and structures the subsequent developments of those analyses.[34] Specifically, there exists an assumption of rational action which implicitly structures and regulates explanation, and provides a core-understanding of the decision making process in which various casual and/or mediating factors are treated as though they were supplementary to that rational process. Even the most tenuous examples of goal-directed action with a basis in rational means and calculations seem to defy the existence of any legitimate alternative.

An initial assumption is made that John Steinbruner's description of the analytic or rational paradigm incorporates the most significant facets of most models of rational decision making into its structure.[35] Immediately, one of the first problems encountered in studying most formal versions of a rational theory of decision is the pervasive tendency, found within those models, to equate "good" or "efficient" decisions with some rational calculations, and thus to incorporate real-world data into the theory in question in such a way as to make data appear to be rational. As

Steinbruner writes :

> "Formal versions of the rational theory of decision are frequently advanced as nominative arguments; that is, as statements of how decisions ought to be made with no necessary implications that they are made in that way ... The transition from a nominative to a positive model is often made by using the critical assumptions tautologously. That is, the decision process is assumed to approximate the formal ideal, and observed data are interpreted in such a way as to make them consistent with the critical assumptions of the paradigm."[36]

According to Steinbruner's view, the critical variables involved in the consideration of complex decisions include -

1) the relation and aggregation of values held by the decision maker (limited value integration);

2) the concept of "maximising utility";

3) the view of uncertainty as largely a statistical problem;

4) the assignment of certain probabilities to values and outcomes;

5) the assumption that decision makers consciously assess alternative outcomes while intuitively updating outcome calculations as a result of their sensitivity to pertinent information.[37]

It is imperative to recognise that any analytic paradigm must be scaled down to human dimensions if it is to represent actual human behaviour. For example, value integration does not mean the integration of all relevant values prior to initiating a trade-off process - no decision maker is capable of this, as Herbert Simon demonstrated, as is discussed below.[38] Rather, it indicates that some limited cost/benefit analysis occurs in which a decision maker evaluates the competing claims of certain values he has already selected above all others, in order to balance them and achieve some satisfactory trade-off or solution.[39]

Formal models of rational decision assume that the decision maker is perpetually engaged in trying to get the whole picture and is virtually always amenable to, and capable of, altering his objectives and outcome calculations in response to new, more pertinent information. There is also the notion that uncertainty exists ("an imperfect correspondence between information and the environment")[40] which affects the way in which the decision maker structures his outcome calculations, although the decision maker is presumably able to compensate for this. In addition, the idea of maximising utility is considered to be a central objective in any "good" decision, lending credence to the assumption that since a rational approach to decision is implicitly concerned with maximising utility, such an approach must therefore be operational in preferred decision calculations. Glen Snyder and Paul Diesing address this point and help to illustrate the crux of Steinbruner's analytic paradigm :

> "The 'rational actor' or 'maximising' theory treats decision making as a process of maximising expected utility. It is assumed that there is a single homogeneous good, utility, that is present in all actually desired ends, and that an increased amount of any end brings with it an increased amount of utility, at a steadily diminished rate ... Second, a set of well-defined and mutually exclusive alternatives is assumed, from which the decision maker is to choose one. Third, it is assumed that the decision maker is able to estimate the outcome and calculate the expected value of each alternative. Given these assumptions, the decision maker calculates the expected value of each alternative, compares all alternatives, and chooses the alternative that maximises expected utility."41]

Recognising how hard it is to achieve pure rationality in the real world of weapons decision making, the approach offered herein is that various phases of pure-rationality decision making should be developed only insofar as it is economical to do so. In other words, when considering inputs in terms of what else could have been done with the resources - such is a more rational process compared with the outputs which are arrived at by a less rational means. Since the notion here is to be as rational as is feasible, the model is limited in its implementation into complex decisions. There is, in analyses of complex decisions, the assumption that more than one actor is often involved. This notion has been lent considerable sophistication by Graham Allison, one of Steinbruner's mentors, in his models of Organisational Process and Bureaucratic Politics.42]

Beginning with Model II, the basis of the Organisational Process Paradigm is governmental action as organisational output. The activities of actors take place with certain established physical routines and "... constitute the range of effective choices open to government leaders confronted with any problem".[43] Organisational outputs also act to "... structure the situation within the narrow constraints of which leaders must make their decisions about an issue. Outputs raise the problem, provide the information and take the initial steps that colour the face of the issue that is turned to the leaders."[44] The output produced by an organisation is subject to certain parochial priorities and perceptions which are the result of factors as wide-ranging as the career goals of relevant officials and the selective cognitive ordering employed by participants in integrating new and perhaps contradictory information into an approved organisation perspective. The operation of governmental organisations is also influenced by the necessity of paying "sequential attention" to goals by adhering to "standard operating procedures", by avoiding uncertainty and by effectively co-ordinating the activities of members of the organisation.[45] In other words, organisational activity is predominantly characterised by a dominant inference pattern, which, in turn, is responsible for structuring the programmes and routines that produce output. In practice, these routines result in only limited alternative courses of action, generally because organisations are concerned more with presenting opinions and thereby perpetuating and possibly enhancing their influence.[46] It is within this type of constraint that the analytic or cognitive actor must operate; but before proceeding to a discussion of the second type of actor, it is important to expand upon Allison's Organisational Process Paradigm by looking at his Model III : Government or Bureaucratic Politics.[47]

This model posits that the political "chess game" of competing organisations is motivated not merely by the reasons found within the Rational Actor Model (Model I - the notion of maximising expected utility), or by the standard operating procedures of Model II. Rather, the progression is also marked by the manipulative skill and political power brought to the political game by the individuals/groups upon whom its course depends. Within this view, government action becomes a political resultant instead of an organisational output. The primary ramification of this approach for top-level decision makers is that while the President remains the final arbiter of given issues and disputes, the inherent complexities involved in establishing goals, alternatives and priorities are such that some sort of consensus-building procedure must occur.[48] There is an "internally inconsistent compromise among competing goals or an incompatible mixture of alternative means for achieving a single goal."[49] The President needs the support of his top advisers and of those around him representing influential organisational interests if his decisions are to be successfully arrived at and effectively implemented. "Presidents manoeuver, persuade and pressure - using all the levers, powers and influences they can muster."[50] It is within this Bureaucratic Politics model then that certain organisational constraints act, in conjunction with the dynamic of the model itself, to inhibit the pursuit of purely rational decisions.

Steinbruner recognised that an important aspect of Allison's Models I and III is an appreciation of the necessity for consensus-building in complex situations. Collective decisions within an analytic paradigm are often seen in terms of an individualised entity with a single view. This makes analysis easier and downplays the personal influence of individual actors. However, this view is obviously insufficient to deal with the procedures involved in arriving at complex decisions. A better way of viewing collective decisions is in terms of consensus-building, as Steinbruner and Allison have pointed out. Steinbruner has written that -

> "the right course to take within the analytic paradigm is [the] attempt to evaluate by debate and mutual effect a set of calculations which meet the criteria of analytic logic. If a dominant decision emerges from the explicit, shared analysis, then according to the analytic paradigm that should be the one taken. If clear dominance of one alternative does not emerge, then the decision taken should at least be within the range defined by the common calculations if the decision is held to be the result of an analytic process.[51]

This is not to make the assumption that leading decision makers necessarily act according to their bureaucratic roles, as Snyder has written[52], but merely that Model III encompasses many of the characteristics responsible for commonly configuring the decision making environment. Allison attempted to alleviate the confusion in decision making with his three Models, especially the delineation between Models I and III. In Model III, Allison argued that the "leaders who sit on top of organisations, as a disunited group, with each leader in his own sight, a player in a central competitive game" acted "in terms of no consistent set of strategic objectives, but rather according to various conceptions of national, organisational and personal goals". He alleged that this led to governmental decisions being made "not by a single rational choice but by the pulling and hauling that is politics".[53]

Applying Allison's competitive game approach (Model III) to the weapons acquisition process does not offer any remedy in as much as on the occasion governmental or contractor decisions are made by a rational choice (for example, chosing a design for radar development). Furthermore, a "rational actor" such as Secretary of Defense Robert McNamara had a "strategic objective" to bring down cost overruns - and implemented his cost benefit analysis to weapons contractors. The new process focused attention on the requirements process and sought to bring to bear on decisions sophisticated analytical techniques and cost-effectiveness concerns. "There were substantial managerial improvements in the sense that validation of requirements was subjected to systematic review and analysis, and the generation of alternative means of meeting requirements came to be an accepted managerial practice".[54] (Perhaps this may have been a personal goal, given that his managerial skills had been accumulated from previous experience.)

Several other flaws are found in Model III as it stands alone. The first and most apparent is that Allison's "leaders" are never clearly defined as to whether they are politicians, political appointees, or civil servants. For example, Allison does not develop the constraint placed upon a politically appointed leader who must still answer to his superior or risk the prospect of resignation. Nor is consideration given to the organisational limitations imposed on them. Considering the constraints placed upon "the leader", Allison's notion of one's stand depends on where one sits, **should read, one's seat** depends on where one stands. Even though Allison refers to "... personal goals", he does not develop that these personal goals of various politically appointed leaders would mirror those of their superiors and work the opposite way in duplicating their policies to the group surrounding or below them. Expanding this notion to include Model II, Allison blurred decision making behaviour by not developing the fact that Model II behaviour (organisational outputs) could act as an input into Model III aside from producing outputs within its own scheme. However, it is important to note that Allison has refined his approach in a more recent work in conjunction with Morton Halperin.[55] Specifically, "he has merged the two conceptual models that he presented as alternatives to the dominant rational actor approach ...", forming one alternative model referred to as the bureaucratic politics model.[56] Arguably, this is a step closer to providing a better paradigm for examining weapons acquisition. Unfortunately, it is not comprehensive enough to encompass the shifting that occurs within the decisional centres. Allison might attribute the shifting to organisational and bureaucratic processes, but this approach neglects variables such as unforeseen events (Yom Kippur War and its effect on the F-16 programme), uncertainties of technology in new weapons, but, most importantly, fails to consider the contributions of individuals' expertise in their specific field (cost-benefit analysis, R & D in avionics, et al). Allison's blending of the two conceptual models (II and III) as an alternative to the rational actor model assumes that it would be of little consequence whether Robert McNamara had been Secretary of Defense, or Pierre Sprey had been a research scientist involved in the F-X study (the study which eventually produced the design for the F-16). Perhaps Allison might argue that given the same circumstances and events of the entire F-16 programme, and regardless of the individual person(s), the ultimate outcomes of the decisions would have been similar to the F-16. The approach herein argues that a Robert McNamara or a Pierre Sprey were of great importance to the decisions of the F-16. The development and acquisition of weapons like the F-16 was not simply an organisational or bureaucratic output. Further, the thesis argues that certain individuals as well as their organisational (bureaucratic) units reflect a greater influence at various stages in the acquisition of a weapons system due to the shifting which occurs within the decisional centres. For example, the case study of the F-16 presents the argument that Pierre Sprey at various stages was more important to the F-16 programme than Robert McNamara. This is not to say that Pierre Sprey was more important to the entire F-16 programme than Robert McNamara - because that statement is an oversimplification which does not take into account the organisational structures of the weapons acquisition process and the shifting that occurs within the process. Thus, an application of Allison's approach does not prove to be an adequate formula to properly explain the weapons acquisition process.

Irving Janis derived a fourth model based on Allison's three conceptual models - the group dynamics approach - better known by the term "groupthink".[57] Groupthink refers to a "mode of thinking that people engage in when they are deeply involved in a cohesive in-group, when the members' strivings for unanimity override their motivation to realistically appraise alternative courses of action."[58] According to Janis' hypotheses, Groupthink is most likely to occur within three situations :

1) The prime condition in group cohesiveness - "... members of any small cohesive group tend to maintain esprit de corps by unconsciously developing a number of shared illusions and related norms that interfere with critical thinking and reality testing."[59]

2) Another condition found by Janis is the insulation of the decision making group "from the judgments of qualified associates who, as outsiders are not permitted to know about the new policies under discussion until after a final decision has been made."[60] For example, in inter-service rivalry, the more insulated a cohesive group becomes, the greater are the chances that decisions will be the precipitate of Groupthink.

3) The more actively the leader of a cohesive Group promotes his own preferences, "the greater are the chances of a consensus

based on Groupthink, even when the leader does not want the members to be Yes-men and the individual members try to resist conforming."[61]

Janis' third hypothesis may resemble the model of the classical approach to the Theory of International Relations (Allison's Model I) rooted in the work of Hans Morgenthau.[62] Analysts using this approach construct a set of objectives that the statesmen responsible for a policy are intending to achieve. "Presuming ways" as Morgenthau said, the aim being to determine the ends the political actor is trying to attain by means of the policy he has chosen; he being a "unitary rational decision maker: centrally controlled, completely informed and value maximising."[63] Morgenthau emphasised the necessity of employing a framework when studying foreign policy. To explain rational action in specific situations, the analyst must examine the nation's problem and re-enact the leader's choice :

> "We put ourselves in the position of a statesman who must meet a certain problem of foreign policy under certain circumstances, and we ask ourselves what the rational alternatives are from which a statesman may choose who must meet this problem under these circumstances."[64]

This is exactly what Janis and Allison were moving away from, for two reasons :

> first, it presumes that the statesman always acts in a rational manner; and second, decision making theory has moved away from the "states-as-sole-actors" approach.

But the applications of Janis' and Allison's interpretations, although one step further away from Morgenthau, do not suffice - the proposal being that there are a multiplicity of decisional centres, not only structures to eventually arrive at a decision at the top, but given the specialisation involved in weapons procurement, autonomy has been granted to lower and middle groups in promulgating decisions. Note, that caution should be exercised, not to construe that the top echelons of the decision making process fit within Allison's bureaucratic politics model whilst the middle/lower level bureaucrats resemble the organisational model. Both act as an input into the other as well as the rational actor model playing a role. It is further complicated by the fact that, ultimately, funding is necessary for the eventual hardware required, and other specialised groups enter the process. In other words, it is a more complicated reality than supposed, and in trying to arrive at catch all explanations of decision making and applying them to reality, distorts the truth. Arnold Wolfers observed, "until quite recently, the states-as-sole-actors approach to international politics was so firmly entrenched that it may be called the traditional approach."[65]

The suggestion of this thesis is that the Organisational Approach and the Bureaucratic Politics Approach be termed the "modern approach", with a new "contemporary approach" to decision making theories reflecting the true complexity of reality. Such an approach would permit decision making to be better explained in terms of reality. An examination of the actors involved, the constraints upon them and their organisations; trends and underlying causes of an individual's preference; the organisational activity and its basis for functioning whether legal or extra legal are but a few examples of the influences that affect decisions. Attempting to emphasise one or two of these, within the scope of a model, disregards other influences. "Models are abstract representations of reality which help us to perceive significant relations in the real world ... in no case are models photographic reproductions of reality."[66] Further, models tend to limit perceptions and capabilities, by the promotion of a given persuasion or the held allegiance to a certain model - such is unproductive.

> "Given the nature of shifts that are occurring in the relative power of governmental institutions, and the persistence of more individualistic models of policy formation, we are faced with a more difficult task in attempting to understand the real nature of bureaucratic involvement in public policy formulation."[67]

Thus, weapons procurement decisions should be viewed as essentially sequential as are most all decisions. Dealing with alternative consequences to make a decision, in which a "decision yields action and action involves the pursuit of goals,"[68] the goals here eventually becoming part of the alternative consequences and so forth. The sequential-decision model was designed by Burton Klein of the RAND Corporation to handle decisions about progress in military research and development.[69] This model is also applicable to other types of decision making. The basic tenet is that "if some information can be learned only during the early stages of carrying out that activity, the more promising alternative ways to carry it out should be undertaken simultaneously, and the decision as to which is the best alternative should be delayed until the information has been learned."[70] However, this presupposes rationality and is not what happens in the stage of Research and Development (R & D). For example, a certain period of time was deemed necessary for the testing, evaluation and analysing of the two design prototypes (General Dynamics YF-16 and Northrop YF-17), before a selection would be made by the US Air Force. However, before the final results were analysed, the time period was shortened, due to such factors as European pressure for the US Air Force to make a choice. The approach herein will argue that R & D, even on operational systems, is a continuous activity not only one of the sequence of stages due to changes in technology.

Similar to Klein's approach and due to the reluctance of people to take decisions based on uncertainty, Charles Lindblom had previously advanced the Incremental Changes Model.[71] Lindblom was also disturbed by the assumption that pure rationality was the best method for decision making, and proposed another model that advocated "muddling through" - a slow evolution of policies by cautious incremental changes. Lindblom stated that in the "conventional ideal of a rational decision, a decision maker maximises something ... but ... an exhaustive search for the maximum, for the best of all possible policies, is not usually worth what it costs ... and an alternative strategy therefore is not to try too hard."[72] Or, as Henry Kissinger stated, "for the statesman, gradualism is the essence of stability."[73] The incremental approach is quite valid for large areas such as social action, in which stability and predictability are the most important values, for example judicial decision making. A decision making system of "moving compromise - specifically a never ending sequence of compromises",[74] has its place in policymaking, but the inference is that drastic changes are avoided, to lessen uncertainties. This does not apply to weapons procurement within the nature of modern weapons themselves, especially when considering technological changes. A philosophy of incremental change in design or "marginal advance if followed would eventually lead to technological stagnation".[75] For US military products there are "demands for technologically advanced weapons [which] require large programs",[76] which are not the resultant of incremental decision making. In fact, the system and types of contracts as well as some of the organisational processes, promotes drastic changes, as well as lessens the risks to those contractors involved.

A final approach merits mention at this stage. Although it was an earlier approach than the others, Simon's satisficing model is of interest before turning to a brief discussion of power. In essence, it is more a behavioural model than a normative one, although it has collected some normative trappings. The Theory of Bounded Rationality, developed by Herbert Simon does not view maximising expected utility - the central tenet of the rational actor approach and of the analytic paradigm - as his objective.[77] Bounded Rationality is a conception of decision which is rationally based but psychologically adjusted. Originally developed as an alternative to what Simon viewed as the impossibility of the human mind to <u>systematically</u> address the complexities of the real world, bounded rationality calls for simplifying reality in one's mind to a sufficient degree that one's limited rational faculty can effectively be brought to bear. However, the greater the degree of simplification, the less optional is one's consequent behaviour with respect to the situation as it actually exists. This is because increasing simplification by definition makes perception a less accurate representation of a more complicated reality.

According to bounded rationality, the process of maximising expected utility found in more strict rational actor models is replaced by the simple notion of "satisficing". Satisficing means that not all, or even most, of the possible alternative options in a situation are considered; the individual is incapable of this. Instead, a course of least resistance, one that is good enough, is chosen by sequentially searching for the first option that "preserves endangered goods at an acceptable level".[78] Relating the two concepts, Simon stated, "the key to the simplification of the choice process ... is the replacement of the goal of maximising with the goal of satisficing, of finding the course of action that is good enough ...".[79]

Further, Simon raised the dichotomy between simplifying and the issue of "increased specialisation in all economic activity" and "increased productivity in any segment of the economy".[80] According to Simon, the "organisms simplification of the real world for purposes of choice introduce discrepancies between the simplified model and the reality".[81]

Thus far, no one conceptual approach offered by previous authors, appears entirely to apply. (For the sake of avoiding redundancy, other literature will be addressed throughout the thesis.) Complicating the use of a single model is the notion that if the decisional centres are indeed shifting,

and if the character of the process changes over time, then the rules of the "competing game" shift alongside. Moreover, "as has been proved by empirical analysis, the research, development, experimenting, production and implementation phases of major weapon systems do follow a very rigid sequential scheme within research and production plants not affected by the vicissitudes in the developments of international politics."[82] This implies that arms procurement is little affected by changes in the international environment. If this is so, then there may also be a self-sustaining phenomena within individual states whereby "defence administrations and those social forces involved in the security and defence business usually put much effort into the maintenance of keeping, once established, research and production plants going since an interruption of the work in these institutions is considered intolerable by the political and military due to the long lead time requirements of modern weapon technology".[83]

The other dimensions which are a part of decision making are power, influence and authority. Considering the long lead time involved in modern weaponry, whoever shall hold that power to steer a system throughout all the stages is of major importance. The approach is that, as the decisional centres shift, so does the influence in decisions, however, authority remains within previously delegated centres. The ability to exercise such authority pertains not only to the particular developmental stage of the weapon system, but also, how the persons in that group immediately concerned with that designated system are able to translate their authority into influence. For example, the approaches of McNamara will differ from those of Weinberger, or a Carter versus a Reagan.

An early study of power was conducted by Robert Dahl in Who Governs.[84] He found that few people in the external community, "individuals in the apolitical strata", had sufficient power to influence decisions and that a power elite, within the organisation, exerted power in almost all decision areas.[85] Every organisation has a dominant set of perceptions concerning what are its roles, missions or functions. And each organisation tries to defend its interests in accordance with the interpretation of its ruling elite, versus the claims of competing organisations.[86] This is of interest to weapons in general, because weapons are procured to defend the national security of a nation, as a whole, but are procured through organisational processes, with different interests and influences. Those completely outside of the organisational processes, which are defence related, have very little influence. Those inside or related (for example, lobbyists representing contractors) are able to influence to varying degrees, conditional to the specific developmental stage of the weapons. "In politics, information is power, and bureaucracies typically possess greater information about their own bailiwick and expertise in their specialty than do outsiders".[87] Those at the top (Secretary of Defense, Congress, et al) may have the authority, but their response, in the form of influence, is predicated on the stage of development.

Another earlier work of significance describing the governmental process as one of inherent bargaining was Richard Neustadt's Presidential Power : The Politics of Leadership. Neustadt's recurring theme is that "Presidential power is the power to persuade."[88] According to Neustadt, the efficacy of a President's influence is derived from three related sources, the bargaining advantages inherent in the job, his professional reputation, and his public prestige. The Presidential task "is to induce them to believe that what he wants of them is what their own appraisal of their own responsibilities require them to do in their interests, not his."[89] "Thus power does not automatically exude from a President; he must work to promote his influence".[90] This is to be applied to all those in a position of authority (for example, Secretaries of Defense and State, National Security Council, Joint Chiefs of Staff, *et al*). Their position of authority does not always influence a given weapon system at all stages. However, caution must be exercised not to envision power as emanating from those in authority at a given time in a weapon system's progress. Power is the "ability of those who possess power to bring about the outcomes they desire".[91] In these regards, considering the long lead times necessary for a weapon system, the tenure of DoD Components can be, and is, translated into power by their influence of marked familiarity as well as their professional expertise with a system.

The important dimensions of power concerning weapons procurement is that it is diffuse, and depending on the stage of development, the influence of those below (DoD Components) may weigh heavily on those in governance. "Employees do not consciously compare their power with the power that the manager has, and then decide whether or not to comply depending on the relative power balances."[92]

As will be discussed, the legal organisational functions and responsibilities and the legal autonomy available to them, make DoD Components perfectly aware of their power to influence those in authority. Furthermore, power being so diffuse, other groups, for example, contractors, given the organisational setting, where legally they are to assist DoD Components in pursuing new technology during the conception and research and development of a weapon system, are in a prime position to direct and persuade those of higher rank. It is important to recognise that those outside a legally prescribed position of authority in weapons procurement do have power/influence if they are within, or are connected in some way along the periphery of the overall defence industry (for example, contractors). Power being implemented through politics leads to another aspect of power, the politics within an organisation. One definition of such power provided by Rourke is that the "first and fundamental source of power for administrative agencies is their ability to attract outside support".[93] This definition is not admissible because DoD Components and the Pentagon conditionally provide for the national security of the nation as a whole. It is the responsibility of Congress to allow for the appropriate funding of the security programmes without public endorsement.[94] In fact, Congress probably receives more criticism than support, and yet, it is an exceedingly powerful organisation. Congressional support for funding weapons development is not a straightforward matter. On the House and Senate sides there are 5 Committees, each, with 10 and 11 sub-committees respectively (total - 31 Committees and sub-committees) involved at some stage of the weapons acquisition process.[95] "This fragmentation of power ensures that all sides of an issue can usually find allies in Congress."[96] Congressional guidance resulting from fragmentation "leaves the military services and the Defense Department with a relatively free hand in responding to it. The Defense Department can pick and choose which guidance it will follow, privately negotiate the relaxation of certain restrictions, or ignore the inconsistent guidance entirely while pursuing its preferred program".[97] Further, although funding is compulsory for the production of weapons, with Congress holding the purse strings, other funds are available outside the boundaries of Congressional overview for Research and Development.

Perhaps the definition, "organisational politics involve intentional acts of influence to enhance or protect the self-interest of individuals or groups,"[98] would be more suitable. This definition is only half the picture because there is the added dimension in weapons procurement that they are also serving the national interest - providing for the national defence. Although this definition does consider the protection of a certain system, which devotes an element of a self-interest (for example, Navy versus Air Force for Lightweight Fighter), it does not take into account the pace of technology. From empirical experience, there are many DoD Components who, in the belief that a certain system should be chosen based on technological advances, would and have been willing to suffer the consequences of setbacks in their groups or self-interest, in the form of trade-offs, by promoting that system. For the purposes of this thesis, politics within organisations will be defined as :

> "Organisational politics involves those activities taken within organisations to

> acquire, develop and use power and other resources to obtain one's preferred outcomes in a situation in which there is uncertainty or dissension about choices."[99]

This definition fits well into the context of this thesis. Pfeffer further states, "an individual, subunit, or department may have power within an organisational context at some period of time; politics involves the exercise of power to get something accomplished, as well as those activities which are undertaken to expand the power already possessed ...".[100]

There is one other aspect of power regarding weapons procurement relating to NATO Coproduction and Foreign Sales. Holsti states, "what is important in international politics is the perceptions of influence and capabilities held by policy makers and the way they interpret another government's signals."[101] This will be apparent, especially from the perspective of foreign governments on how they interpret the signals that they receive for the coproduction of the F-16 and its foreign sales. (Not only by government to government but contractor to government.)

In analysing the decision making of weapons procurement, the normative approaches do not entirely suffice. The approach herein is to accept a rationality limited conceptual approach, (the review of different alternatives as an input). Man is not irrational, however other influencing variables, such as politics, power, self-interest, promotion, _et al_ foster the rationality of the irrational.[102] Certainly, the rejection of pure rationality permits decision making to provide an optimal goal. This mode will best subscribe to the overall shifting of power and decisional centres.

Thus, the major points which have emerged from the preceding discussion imply that decision making in the acquisition process of weapons procurement should be viewed as complex, yet compartmentalised, with power and authority, and the influence of these decision centres being very diffuse. Although conceptual models are relied upon greatly in decision making, in general, there is none that could wholly and concisely explain all of the facts of the weapons acquisition decision making. In essence, this is the theme of this thesis. The models offered herein should not be utilised for research into the decisional processes because they tend to distort the reality of the event. There are many different variables operative from within and on a large number of decisional centres. The decisions of a weapons system may be the resultant of an individual advocate influencing the decision, or the output of organisational factors, or bureaucratic politics, or a combination of all three acting as inputs into each other. Further, the decision may reflect rational and irrational behaviour and the multitude of actors involved may range from the President of the United States down to a systems analyst working within the research laboratory of a weapons contractor.

Although the decisions of weapons acquisition, as explained above, appear to have much in common with general decision making, the variances between these two procedures is the substance of this thesis. The thesis argues that as a weapons system continues through the developmental stages of its life, the decisional centres exerting influence shift as that weapons system progresses from one stage to the next. Moreover, the other dimensions to be considered is that these decisional centres also shift along a structured yearly cyclical pattern regardless of the stage of development of that weapon system. The key elements which determine at what time a decisional centre is more important than another is measured by the amount of influence it yields, and the level of responsibility that centre has for that decisional stage. An examination of this scale must uncover the relevant actors and their relationships to determine their levels of influence as well as the organisations, and the structural processes of weapons acquisition.

Although previous research has been motivated by exposes of mismanagement, or the misapplication of the analyses of one stage, or one weapons system to all stages of the process, it is imperative to examine the organisational structures and the parameters exercised from the framework to grasp the actuality of the decisional processes. Moreover, the suggestion being that since these decisional centres are shifting the decisions should also radiate upwards from subordinates as well as those, at given times, exercising their authority downwards. "[The] most important policymaking echelon in public bureaucracy is that level which actually delivers the services to the client. The decision making of many of the lowest-level administrators may have more to do with the real outcomes of policy in society than do all the decisions made by senior bureaucrats heading the huge organisations."[103] Thus, having chosen to examine the actors and organisations involved should illustrate what influences, if any, the DoD Components exert upwards. However, to obtain an even clearer picture of the activities of DoD Components et al, the processes of acquisition must also be analysed because "defense policy in this country [US] is not marked by the free play of bureaucratic bargaining or by open processes ..." as are other types of policy formulation.[104] To substantiate this, and the shifting that occurs, more proof is required than just a description of the acquisition processes. For example, another source of influence is the DoD Components' close association with the weapons contractors (and other associations) throughout the life of a weapon system, particularly during the stage of Concept Exploration. Thus, aside from weapons contractors just providing the goods they also must exert inputs into the decisional processes. Proof of this will be illustrated through their Research and Development and Test Evaluation of systems, regardless of their stage. And, there are other dimensions which are operative, for example, the considerations of cost overruns are not only the fault of the contractors but also the blame should rest with the DoD Components as well as the Government (for example, costs were increased from the coproduction effort of the F-16). These and other relationships will be discussed to enhance the understanding of the DoD Components' role in the Acquisition Processes.

To systematically review and analyse the processes of weapons procurement, Chapter 2 discusses US defence planning by identifying the major actors or groups involved. Evidence is provided so as to view those in authority operating in their capacity as managers as well as politicians. This Chapter also illustrates some of the roles of the DoD Components, but the proof of their influences is highlighted in Chapters 3 and 4.

Chapter 3 will then detail the organisational, as well as the structural, processes, and those involved in a weapons system's Fiscal Cycle - which it must pass through each year of its life. Also, the overall process and decisional structures of the Life Cycle is included in Chapter 4 with interesting relationships demonstrated between both Fiscal and Life Cycle processes. By reviewing the organisations, and those involved, it becomes apparent that in the earlier stages of a weapon system the decisions are structurally at lower levels. Moreover, it should be clearer as to why lobbyists/contractors tend to knock on the doors with a lesser amount of brass.

In Chapter 5, to test and evaluate the preceding discussion, the focus changes to a review of the F-X studies - the conception of the F-16, and who was more involved in the decisions. It is not intended to be a complex historical account, but encompasses all of the major events, actors and organisations up to and including the Congressional decision to fund a prototype in Fiscal Year 1972.

Chapter 6 continues, and proceeds to the Air Force choosing the F-16, after a prototype competition with the F-17, in January 1975. The reasons for the choice and the additional consideration of who ~~m~~ was influencing whom, now that the system had been politicised since 1972, demonstrates some interesting features of the decisional process.

Chapter 7 then turns attention to the implementation and production of the programme. Although the process is highly politicised with sizeable sums of money under consideration, and used for leverage in bargaining, the corporate memory emanating from the concerned DoD Components is still exercising its influence. NATO and the coproduction effort of the multi-national F-16 is also the focus, as well as foreign sales, in Chapter 7. Throughout Chapters 5 and 6, the NATO connections are discussed, as to the relevance of the decisions at each subsequent stage. However, a wider application of the impact of the coproduction programmes is examined. A brief survey of the foreign sales also emphasises the different decisional centres at work, where foreign sales are a highly politicised issue. Following this, is the Conclusion.

N O T E S

1. BAKIONE, D., (former Deputy Assistant Secretary of Defense) (Procurement) OASD (I & L), Defense Management Journal, Vol. 11, No.3, July 1975, p.2.

2. In 1981, the global community spent $500 billion for military purposes, which is more than the GNP of Africa and the Near East taken together, and approximately 500 times the regular budget of the United Nations. [Source: Miroslav, N., "The Arms Race", Praeger Publishers, New York, 1982, p.1.]

   In the US, three years later, in his fiscal year (FY) 1984 defense budget President Reagan proposed total obligational authority of $274.1 billion, representing a 10% real increase over FY 1983. This brought defense spending to 28% of the total federal budget, and 6.8% of the GNP. [Source: DoD Annual Report to Congress 1983 (Weinberger) p.4.]

   In 1986, a year designated as the United Nations International Year of Peace, the global community spent nearly $900 billion on weapons. This involves 100 million people in which the sum breaks down to $1.7 million spent every minute and represents about 6 per cent of the world's gross national product. The two superpowers, with less than 11 per cent of the world's population, account for 23 per cent of the world's armed forces, 60 per cent of the military expenditures, more than 80 per cent of weapons research and 97 per cent of all nuclear warheads and bombs. The US in 1985 spent $268 billion; the USSR in 1985 spent $237 billion. See, Report by Ruth Leger Sivard, former Chief of the Economic Division of the US Arms Control and Disarmament Agency, as printed in, the Washington Post, 24 November 1986, p.A16.

3. MELMAN, S, "Pentagon Capitalism, The Political Economy of War", McGraw-Hill, New York, 1970, p.4.

   Author's Note: The common mistake of those who subscribe to the military-industrial arguments is that they tent to construct their theories based on the large amounts of money devoted to the US defence industry and compare it to other nations' wealth and not the overall entire wealth of the US - it is an "apples and oranges" comparison. A further criticism is that these theorists perceive foreign military sales as essentially promoting sales, disregarding the facts that in many cases it is the foreign countries who request such sales; or that other defence related organisations, ie Congress, are in the position to stop such sales (eg sales of F-16 to Jordan).

4. "Military Procurement : Still an Unresolved Problem", the Defense Monitor, Center for Defense Information, Washington DC, Vol.V, No.8, October 1976, p.7.

   Author's Note: It will be shown that not only the contractors are at fault due to the organisational structure of weapons procurement - the DoD Components are equally optimistic in their early appraisal of costs as are the contractors.

5. PACKARD, D, Former Deputy Secretary of Defense, address to the Armed Forces Management Association, August 1970, as printed in Defense Monitor, op.cit.

6. MELMAN, S, "Pentagon Capitalism, The Political Economy of War", op.cit.

7. SAMPSON, A, "The Arms Bazaar, The Companies, The Dealers", Viking Press, New York, 1977, p.7.

8. Ibid, p.68.

9. THAYER, G, "The War Business, The International Trade in Armaments", Paladin, London, 1970, p.113.

10. BLOOMFIELD, L, and LEISS, A, et al, "The Control of Local Conflict", Center for International Studies, Cambridge, Massachusetts, 30 June 1967.

11. MILLIS, W, "Arms and Men", Putnams, New York, 1956; ENGELBRECHT, H, and HANIGHEN, F, "Merchants of Death", Dodd and Co, New York, 1934; KEMP, G, "Arms Sales and Arms Control in Developing Countries", World Today, September 1966; HOWE, R, "Weapons", Cox & Wyman, London, 1980; WILTZ, J, "In Search of Peace", Louisiana State University Press, 1963.

    Even DORFER, I, "Arms Deal, The Selling of the F-16", Praeger, New York, 1983, states at the outset "thus the lightweight fighter competition was seen as one possible avenue to future sales. In many respects it was characteristic of the US defense industry".

12. LONG, F, and REPPY, J, "The Genesis of New Weapons, Decision Making for Military R & D", Pergamon Press, New York, 1980.

13. Ibid, p.17.

14. CANNIZZO, C, "The Gun Merchants", Pergamon Press, New York, 1980. For example, another book by EDMONDS, M, "International Arms Procurement", Pergamon Press, 1981, might also lead an observer of weapons decision making into the same trap. This author is not suggesting that this is the fault of the authors in any way - the works of the authors, particularly Martin Edmonds, detailing efforts to achieve Rationalisation, Standardisation and Interoperability of weapons systems for NATO, is an excellent account of such, but must not be applied to all of the decisional stages and processes of weapons procurement.

15. Ibid, p.15.

16. PECK, M, and SCHERER, F, "The Weapons Acquisition Process : An Economic Analysis", Harvard University Press, 1962, p.17.

17. SIMON, H, "Models of Man : Social and Rational", Wiley and Sons, New York, 1957, p.198.

18. ARVIS, P, (Director, Army Procurement Research Office), "Systematic Research, A Tonic for Procurement Headaches", Defense Management Journal, July 1975, p.7.

19. PECK, M, and SCHERER, F, "The Weapons Acquisition Process : An Economic Analysis", Harvard University Press, 1962.

20. Ibid, p.581.

21. For example : HEAD, R, "Decision-making on the A-7 Attack Aircraft Program", "The A-7 Decisions : A Case Study of Weapons Procurement", American Defense Policy, John Hopkins Press, 5th Edition, 1982. Head proposed a detailed study of the A-7 Attack Aircraft drawing heavily on Graham Allison's three conceptual models to see if they explain defence decision making. Another example is, ARMACOST, M, "The Politics of Weapons Acquisition : The Thor-Jupiter Controversy", Columbia University Press, New York, 1969.

22. Department of Defense (DoD) Components refers to the professional bureaucrats, civilian as well as military, working at the Department of Defense (DoD)/ Pentagon. The label of DoD Components does not include the political appointees to the DoD, for example, Secretary of Defense (SECDEF), Deputy Secretary of Defense, and so forth.

23. EDMONDS, M, "International Arms Procurements, New Directions", Pergamon Press, New York, 1981, p.191.

24. Report on "The Acquisition Cycle Task Force", Office of the Under Secretary of Defense for Research and Engineering, Department of Defense, Washington DC, 1978, p.1.

25. The author was employed from 1977 through 1981 at the law firm of Seyfarth, Shaw, Fairweather and Geraldson, Washington DC (Headquarters: Chicago with offices in New York, Los Angeles, Washington DC and Miami). The position involved work as a Legislative Analyst spending much time lobbying the interests of clients at the White House, Congress and various Executive Agencies. Many of the clients were defense related.

26. According to Young, two ways to handle decision making in the face of uncertainties and significant risks are by (1) maximising expected value, and (2) loss minimising. See, YOUNG, O, "The Politics of Force", Princeton University Press, New Jersey, 1968, pp.32-33.

27. PECK, M, and SCHERER, F, "The Weapons Acquisition Process", op.cit., p.17.

28. COLLIER, B, "Arms and the Men", McWilliam, New York, 1980, p.1.

29. ROSENAU, J, "Scientific Study of Foreign Policy", Nichols Publ. Co., 1980, p.314.

30. JACOBSON, ZIMMERMAN, et al, "The Shaping of Foreign Policy", 1969, p.161.

31. DROR, Y, "Public Policy Re-examined", Prentice-Hall, New Jersey, 1983, p.X.

32. Idem,

33. SCHELLING, T, "Arms and Influence", Yale University, 1966, p.135. See also ALLISON, G, "Essence of Decision, Explaining the Cuban Missile Crisis", Little Brown and Co., Boston, 1971.

34. For example, the rational actor/unitary command models, bounded rationality, instrumental rationality, Bureaucratic Politics, Organisational Process incorporate certain rationally based assumptions.

35. STEINBRUNER, J, "The Cybernetic Theory of Decision", Princeton University Press, New Jersey, 1974.

36. Ibid, p.26.

37. Ibid, pp.31-35.

38. SIMON, H, "Models of Man : Social and Rational", Wiley and Sons, New York, 1957.

39. Even the term cost/benefit analysis conjures the notion of being rational and scientific. However, regarding arms procurement, cost benefit is more art than science. As the US Government Accounting Office Report states - "cost estimates are not statements of fact; rather they are judgments of the cost to perform work under specified conditions. For programs that span years from the drawing boards to completion, economic uncertainties and technological risks are inherent". See. "A Range of Cost Measuring Risk and Uncertainty in Major Programs - An Aid for Decision Making", GAO Report, Washington DC, 3 February 1978, p.i.

40. STEINBRUNER, J, "The Cybernetic Theory of Decision", op.cit., p.36.

41. SNYDER and DIESING, "Conflict Among Nations : Bargaining, Decision-making and Systems Structure in International Crises", Princeton University Press, New Jersey, 1977, p.340.

42. ALLISON, G, "Essence of Decision : Explaining the Cuban Missile Crisis", Little Brown and Co., Boston, 1971.

43. Ibid, p.79.

44. Ibid, p.79.

45. Ibid, pp.82-85.

46. Ibid, p.90.

47. Ibid, pp.144-184.

48. Ibid, p.162.

49. HILSMAN, R, "To Move a Nation, The Politics of Foreign Policy in the Administration of John F Kennedy", Delta Books, New York, 1967, p.5.

50. Ibid, p.6.

51. STEINBRUNER, J, "The Cybernetic Theory of Decision", op.cit., p.38.

52. See, Snyder's footnote in SNYDER and DIESING, "Conflict Among Nations", op.cit., 408.

53. ALLISON, G, "Essence of Decision : Explaining the Cuban Missile Crisis", op.cit., p.144.

54. LONG, F, and REPPY, J, "The Genesis of New Weapons", op.cit., p.165.

55. ALLISON, G, and HALPERN, M, "Bureaucratic Politics : A Paradigm and Some Policy Implications", in TANTER, R, and ULLMAN, R, "Theory and Policy in International Relations", Princeton University Press, New Jersey, 1972, pp.40-79.

56. SMITH, S, "Allison and the Cuban Missile Crisis : A Review of the Bureaucratic Politics Model of Foreign Policy Decision Making", Journal of International Studies, Vol.9, No.1, 1980, pp.22, 23.

57. JANIS, I, "Victims of Groupthink", Houghton, Mifflin & Co., Boston, 1972. It should be noted that it is Irving Janis' intention to supplement, not replace, the standard approaches to the study of political decision making.

58. Ibid, p.9.

59. Ibid, p.37.

60. Ibid, p.197.

61. Idem.

62. MORGENTHAU, H, "Politics Among Nations, The Struggle for Power and Peace", Knoph Publishing Co., New York, 1973.

63. Ibid, p.5.

64. Idem.

65. WOLFERS, A, "The Actors in International Politics", as printed in FOX, W, "Theoretical Aspects of International Relations", University of Notre Dame Press, Notre Dame, Indiana, 1959, p.83.

66. HITCH, C, McKEAN, R, "Efficiency in Military Decisions", American Defense Policy, Johns Hopkins Press, Maryland, 1965, p.206.

67. PETERS, G, "*Bureaucracy, Politics and Public Policy*", Journal of Comparative Politics, Vol.11, No.3, April 1979, p.340.

68. JONES, R, "*Analysing Foreign Policy : An Introduction to Some Conceptual Problems*", 1970, p.43.

69. KLEIN, B, RAND Corporation, *as printed in* DROR, Y, "*Public Policy Re-examined*", New Jersey, 1983, p.142.

70. *Idem*.

71. LINDBLOM, C, "*The Policy Making Process*", Prentice-Hall, New Jersey, 1968.

72. *Ibid*, p.24.

73. JACOBSON, ZIMMERMAN, *et al*, "*The Shaping of Foreign Policy*", section by Henry Kissinger, 1969, p.156.

74. LINDBLOM, C, "*The Policy Making Process*", *op*.*cit*., p.24.

75. ALEXANDER, A, "*Weapons Acquisition in the Soviet Union, United States and France*", Paper prepared for a Conference on Comparative Defence Policy, 8-9 February 1973, p.9.

76. *Ibid*, p.21.

77. SIMON, H, "*Models of Man : Social and Rational*", Wiley and Sons, New York, 1957.

78. *Ibid*, p.124.

79. *Ibid*, p.204.

80. *Ibid*, p.208.

81. *Ibid*, p.256.

82. ALBRECHT, V, GALTING, J, JOENNIEMI, P, SENGHAS, D, VERONA, S, "*Is Europe to Demilitarise*", Institute on Research on Peace and Violence, Tampere Research Institute, Finland, No.4, 1972, p.191.

83. *Ibid*, p.191.

84, DAHL, R, "*Who Governs*", Yale University Press, Connecticut, 1961.

85. Ibid, p.91. Robert Dahl's Who Governs is controversial regarding his persuasion of a power elite which he himself does not resolve as to whether or not such exists. For example, "in the two political parties ... the proportion of higher offices held by Social Notables was infinitesimal" (pp.64-65), preferring to influence covertly instead of direct participation (Kennedys, Rockefellers, Senator Heinz, et al evidence the opposite). On the other hand, although "an elite no longer rules New Haven" (p.86), the disappearance of the elite rule "has not led to the emergence of rule by the people" (p.86). Instead, leaders are "enormously influential - so influential ... they might well be considered a kind of ruling elite". (p.89).

86. Morton Halperin termed this set of conceptions as "organisational essence", See, HALPERIN, M, "Why Bureaucrats Play Games", Foreign Policy, Spring 1971.

87. McCARTNEY, J, "Sources of Bureaucratic Power", US Air Force Journal, USAF Academy, Colorado 1976, p.104.

88. NEUSTADT, R, "Presidential Power : The Politics of Leadership", Wiley and Sons, New York, 1960, p.10.

89. Ibid, p.46.

90. ROSATI, J, "Developing a Systematic Decision-making Framework : Bureaucratic Politics in Perspective", World Politics, Vol.XXXIII, October 1980 - July 1981, p.234.

91. PFEFFER, J, "Power in Organisations", Pittman, Boston, 1981, p.3.

92. Ibid, p.5.

93. ROURKE, F, "Bureaucracy, Politics and Public Policy", Little Brown and Co., Boston, 1969, p.11.

94. Given the uniqueness of weapons, whereby they are requested by the military, produced by the militarily related contractors for use by the military, and the uniqueness of secrecy and technological advances, it is not always necessary to require or even lobby in an effort to receive public support. Care should be taken not to treat the development of every weapon as an issue, although some may become controversial not so much in themselves but usually as part of a greater issue. For example, President Reagan may not have obtained the number of MX missiles he desired, which is part of the larger issues dealing with SALT, US-Soviet relations, limitations on ballistic nuclear missiles et al. And an example of technological secrecy would be the announcement on 1 November 1986 by the USAF awarding funds to both Northrop and Lockheed to design and prototype a new fighter for the 21st Century incorporating the stealth technology (which in itself is restricted from the public domain).

95. Senate

Committee (Cmte) on Appropriations
- Sub-Cmte on Defense
- Sub-Cmte on Foreign Operations
- Sub-Cmte on Military Construction

Committee on Armed Services
- Sub-Cmte on Manpower and Personnel
- Sub-Cmte on Military Construction
- Sub-Cmte on Preparedness
- Sub-Cmte on Sea Power and Force Projection
- Sub-Cmte on Strategic and Theater Nuclear Forces
- Sub-Cmte on Tactical Warfare

Committee on Budget
Committee on Finance
- Sub-Cmte on International Trade

Committee on Foreign Relations
- Sub-Cmte on Arms Control, Oceans and International Operations

<u>House of Representatives</u>

Cmte on Appropriations
Sub-Cmte on Defense

Cmte on Armed Services
Sub-Cmte on Military Installations and Facilities
Sub-Cmte on Military Personnel
Sub-Cmte on Procurement
Sub-Cmte on Readiness
Sub-Cmte on Research and Development
Sub-Cmte on Seapower and Strategic and Critical Matters

Cmte on Budget
Sub-Cmte on National Security Programs

Cmte on Foreign Affairs
Sub-Cmte on International Security and Scientific Affairs

Cmte on Government Operations
Sub-Cmte on Legislation and National Security

Source: Congressional Staff Directory, Washington DC, 1985.

96. HUGHES, P, "<u>Congressional Influence in Weapons Procurement</u>", Public Policy, Vol.28, No.4, 1980, p.428.

97. <u>Ibid</u>, pp.28-29.

98. ALLAN, R, MADISON, D, <u>et al</u>, "<u>Organisational Politics : Tactics and Characteristics of its Actors</u>", California Management Review, 1979, p.77.

99. PFEFFER, J, "<u>Power in Organisations</u>", <u>op.cit.</u>, p.7.

100. <u>Idem</u>.

101. HOLSTI, K, "<u>International Politics : A Framework for Analysis</u>", Prentice-Hall, New Jersey, 1983, p.147.

102. The production of weapons themselves has been argued to be irrational. For example, "the paradox of deterrence is that it does not always help to be, or to be believed to be, fully rational, cool headed, and in control of oneself or one's country". <u>See</u>, SHELLING, T, "<u>Arms and Influence</u>", Yale University, 1966, p.37.

Schelling

103. PETERS, G, "Bureaucracy, Politics and Public Policy", op.cit., p.353.

104. ROHERTY, J, "Defense Policy Formation", Institute of International Studies, University of South Carolina, 1980, p.3.

CHAPTER 2

PLANNING US DEFENCE POLICY

Conventional wisdom dictates that comprehensive defence planning and decision making is the province of the Executive Branch; Presidents are perceived as the pivot. They either make the most important planning decisions or retain responsibility when they delegate authority for the subordinates to make them. In the idealised case, "comprehensive national security policy, promulgated by the President, forms the foundation for defence planning in conformation with proven procedures. He hand-picks so-called qualified Cabinet officials, who participate in that process - the Senate probes and confirms their competence,"[1] together with appointed senior subordinates, both military and civilian. Positioned beneath them, the next in order are the "career" military officers. They remain outside the sphere of Congressional approval or civilian scrutiny, though they are dependent upon Congressional funding and civilian groups (contractors, lobbyists, *et al*). They seemingly participate in the implementation of defence policy guidance which comes from their superiors. Therefore, in the ideal case, the military at all levels is held in check by a civilian "checks and balances" and those at the top, the appointed civilians, determine overall defence policy.

The intention of this Chapter is to describe defence planning and defence decision making as it effectively operates, compared to the simplistic explanation offered above. Before doing so, it is necessary to mention that in attempting to assess the decision making within an organisational political system such as the defence establishment, two tasks are required :

"1) The principal organisational actors need to be identified on a meaningful basis

2) then, the power of these various actors needs to be assessed."[2]

Pfeffer states further that in identifying the relevant organisational units "it is wise to start with the labels used in and provided by the organisation."[3] However, extreme caution must be exercised since although separate units, National Security Council (NSC), Department of Defense (DoD), et al, will be identified, people within these organisations also have multiple interests which are cross-cut in a variety of ways. For example, a given individual may move from the Department of State to the Department of Defense, later to the Staff of the National Security Council, followed by two years at the Senate Armed Services Committee and presently works in the Office of Management and Budget.[4] Other variables for consideration are educational background and disciplinary background (law, business, engineering) and so forth. The list is infinite. Primarily, the discussion in this Chapter and the next shall clarify the established units of defence decision making and, second, what power and influence by law, tradition or whatever means, shall be exercised by these units in promulgating decisions.

Commencing with the top of the chain of command - and stated outright - Presidents are the Commanders-in-Chief of the US Armed Forces, but they are not experts in the field of national defence. Dwight D. Eisenhower was the only defence specialist to occupy the White

House in this century. Strategic expertise will almost certainly continue to be the exception, rather than the rule, for US Presidents. They come from all walks of life and once installed have little time to digest all facets of defence planning. The XXII Amendment to the US Constitution, proclaimed on 1 March 1951, permits each President no more than two four-year terms, plus "two years of a term to which some other person was elected". In the period under review, excepting Reagan, only two Presidents since 1960 have endured even half that long (Johnson - 5 years, 2 months; Nixon - 4 years, 7 months). Moreover, during their time in office, the Presidents must address themselves to many other demanding issues that compete with their attention for the national defence.

Chief Executives are therefore compelled to depend on advice from civilian officials, whom they appoint, and military professionals, who may have been picked by predecessors. Therefore, the Commander-in-Chief will receive little attention in this study. This is intentional, to stress the point that the organisational processes either within which he himself operates, regarding defence matters, or lower level organisations making up the network, are to be the main focal point. The President's educational background, personality and tenure are all important variables in terms of leadership. However, these variables also have a far-reaching effect on the reception that the President receives from organisational units. Far too often, the error is made to single him out of the various organisations and treat him as if he were a mediaeval king able to promulgate decisions capriciously or without constraint. For example, the decision to manufacture the F-16 was made in 1975 - during President Ford's tenure - and he and the American government received the credit,[5] even though the original decisions to design and manufacture were received during Carter's tenure. In actuality, it was a US Air Force decision, announced on 13 January 1975 by the Secretary of the Air Force, Dr John L McLucas, who had already secured money ($417,904,758) from Congress the previous year to fabricate 15 engineering development F-16 aircraft.[6]

US defence planning is determined by a joint decision making system able to deal with some issues better than others. The chief policymakers of this joint system are the National Security Council Staff, the Department of State and the Office of the Secretary of Defense for they are the consumers of the institutional (Joint Chiefs of Staff, Military Services) product of military advice.

<u>The National Security Council</u>

The foremost defence related organisation within the Executive Branch is the National Security Council. It is the forum within which the President operates in either promulgating or making decisions. The National Security Council, supervised by the National Security Adviser[7] and his "NSC staff of fewer than fifty professionals are occupied with virtually every serious national security and international economic problem confronting the government".[8] The Council includes the President, the Vice-President, the Secretaries of State and Defense, and the heads of the Central Intelligence Agency and the Joint Chiefs of Staff. The President chairs the National Security Council (NSC), whose members ideally "assess and appraise (US) objectives, commitments and risks ... in relation to our actual and potential military power", then advise him, "with respect to the integration of domestic, foreign and military policies."[9]

The Council's apparatus and procedures for application, however, have been an institutional "roller coaster" since the NSC's inception in 1947. Rapid rises to peaks and plunges of influence within the NSC occur repeatedly, whilst successive Presidents reshape Council purpose and structure to suit their temperaments.[10]

Every President, since Eisenhower, has installed a National Security Adviser. Associated functions have never been subject to statutory restrictions, since their post is not prescribed by law. For example, uniformed officers on active duty are eligible but none have been selected.[11]

The Council, unlike the Cabinet, had for its birth the sanction of an Act of Congress where, under its statutory charter, the Council is concerned only in policy matters effecting the security of the nation. On the other hand, the Cabinet handles other policy areas such as labour, health, education, justice and commerce. The purpose of the Council is to integrate aspects of national security policy including foreign, military, economic, fiscal and internal security to the end that "security policies finally recommended to the President shall be both representative and fused, rather than compartmentalised."[12] It is imperative to emphasise that the role of the NSC is supposed to be an advisory one - "it recommends, it does not decide".[13] Whatever final policy is approved by the President, "after such modifications or rejections of the Council's views as he may determine, is the policy, not of the Council, but of the Chief Executive".[14] Such is the simplistic view that would subscribe to Allison's Rational Actor Model. Moreover, what pressures, if any, would Janis'

"Groupthink" have on the President in his range of policy choices; and what pressures would be exerted on the individuals of the group to keep his or her seat depending on his or her stand? These questions arise upon viewing the roles of various National Security Advisers and their relations with the President. Once this has been accomplished, it should become apparent that the NSC by "its nature ... is very much dependent on the personal style and wishes of the President whom it serves".[15]

At its inception, President Truman preferred a career staff that would furnish continuity for the NSC. So did Eisenhower, his successor, who felt a strong core should remain in place while administrations filed past.[16] Their prescriptions did not persevere. Staffers, since then, when appointed, have characteristically been "foreign policy [and defence] professionals rather than political appointees in the partisan sense" but, with few exceptions, were forced to leave when party affiliations of Presidents changed, obviously indicating that indeed they are political appointees.[17]

Richard Nixon promised to restore the NSC "as the principal forum for Presidential consideration of foreign [and defence] policy issues", starting in 1969. Its immediate "mandate" was to "clarify our view of where we want to be in the next three to five years".[18] In 1969, Mr Nixon "revised the status and doubled the staff of the National Security Council and created under it the Defense Program Review Committee"[19] with the intention that, as Morton Halperin wrote, "decisions not only on the total size of the Defense Budget but also on Major Defense Programs will be made outside the Pentagon in an inter-agency forum where White House influence is dominant".[20] This intention was not fulfilled during the Nixon Administration. The Defense Program Review Committee "discussed a number of problems concerning strategy and weapons procurement, but the task of allocating resources was undertaken by Mr Laird, Mr Nixon's first Secretary of Defense and by his successors."[21]

Ford's NSC began with Dr Kissinger, left alone in the seat for 15 months. Dr Kissinger chaired seven out of nine substructures until November 1975. President Ford replaced Dr Kissinger with Mr Brent Scowcroft. There were no sharp changes while Mr Scowcroft held the post. Partly, this was due to the fact that Dr Kissinger still dominated in Council meetings as Secretary of State, and his influence remained strong.

Carter reorganised the NSC, and returned many responsibilities to Cabinet positions, and further compressed the staff, which was small compared to predecessors since 1969. "Kissinger had built the staff into a mini-empire of 200 people."[22] Kissinger relied less on the Council as an institution than did Brzezinski, his NSC Assistant, who became a powerful figure but never dominated as Kissinger did.

Richard Allen, President Reagan's original National Security Adviser, maintained a low profile compared to predecessors Henry Kissinger and Zbigniev Brzezinski. William Clark, his inexperienced replacement, reportedly was part of a revolutionary experiment.[23] Clark was replaced by his Deputy Assistant, Robert McFarlane, who "resigned abruptly after repeated clashes with the White House Chief of Staff Donald Regan".[24] His replacement, Vice Admiral John Poindexter, was the "invisible man" of policy making; as a US official said, "his military training has taught him never to outshine a superior".[25] Poindexter's replacement, Frank Carlucci III (2 December 1986), has expertise in foreign affairs as a senior diplomat as well as experience in the military (Deputy Secretary of Defense) and intelligence (Deputy Director,CIA) field. Nevertheless, National Security policy formation for the Reagan Administration lacks corporate memory at the top. Backgrounds of the other Advisers are discussed in footnote 26].

Another function of the NSC is to advise the President on how to avoid the "problem of a growing national security policy bureaucracy".[27] The NSC was to serve as a "means for co-ordinating the activities of the various departments and agencies."[28] The aim was to give the White House a system for weighing the complex information and proposals flowing in from diplomatic, military and intelligence agencies. This has not been the case because the NSC is not presently scrutinised by Congress and "by the late 1960s, the NSC and especially the Security Adviser had become a powerful locus of national security advice and formulation."[29]

NSC Staff

In co-ordinating policy concerning national security matters, the NSC, as other agencies, has at times succumbed to the problem of balancing operations with plans. A pre-occupation with operations as opposed to plans tends to distort priorities. Both functions are important and should proceed simultaneously. Nevertheless, the NSC often grinds to a halt with daily business. Furthermore, that condition can occur despite contrary intentions. Nixon and Carter, together with their National Security Advisers, set out to re-establish the primacy of plans, which had diminished during immediate predecessors' tenure. Both teams, however, soon found fast-moving events more compelling. Kissinger devoted much of his time to shuttle diplomacy; Brzezinski was better known as a "big time operator" than as a painstaking planner. The NSC activities during their tenure reflected those roles[30], as well as their preferences for operations.[31]

Aside from the above, competition between the NSC staff and Cabinet members, uncontrolled or even encouraged by some Presidents, tends to undercut coherent policy. A bitter rivalry ensued when Brzezinski clashed with the Secretary of State, Cyrus Vance, making co-operation, compromise and top-level co-ordination almost impossible. On the other hand, even though Nixon/Kissinger enjoyed collegial relations, ensuring conceptual continuity by cutting out other opponents (Rogers, Clifford, Laird, Richardson, Schlesinger), policy still suffered because decision making in isolation discarded options that might have proven to be better than those adopted, if they had been debated objectively.[32] This is not intended to be axiomatic of decision making in general, but is axiomatic in defence decision making when considering that the National Security Council, Department of State and the Office of the Secretary of Defense are "in this together", as both the consumer and civilian watchdog of the military activities generated by their non-civilian counterparts.

The personal influence and preferences of the President for the role of the National Security Adviser, determines whether the National Security Adviser or the Secretary of State sets the parameters of national security and foreign policy. Whether it was a personal preference or as a resultant of the competition mentioned above, a former Deputy Director of the NSC, William Hyland, stated that "it is possible that the staff operates autonomously. The staff is doing things that the top members of the National Security Council do not know about... For example, Rogers (Secretary of State 1969-73] knew nothing of Kissinger's trips to China ... or Shultz (Secretary of State 1982-) not knowing of McFarlane in Iran."[33] Perhaps this is partly due to the "breadth of issues in which this office is involved, it seems unreasonable to expect that it will produce, on a sustained basis, foreign and defense policy guidance that could serve both America's enduring national security interests and the divergent needs of competing organisations."[34] Thus, considering the flux of personal priorities of the President and his NSC Adviser, and the varied issues confronting the NSC, it is highly doubtful, excluding clandestine operations, that the NSC exerts influence on a constant and regular basis in the routine decisions of weapons acquisition.

Furthermore, Congressional hearings have been held concerning the possible Senate confirmation of the National Security Adviser, who thus far has served exclusively for the President, and need not be confirmed by the Senate since the post is not prescribed by law. As Senator Edward Zorinsky explained, "It's clear that we have two Secretaries of State ... and it's time we made the other one accountable too."[35]

The Department of State

As the second consumer and policy-maker of defence policy guidance, "the Department of State advises the President in the formulation and execution of foreign policy."[36] Its primary objective is to promote the long-range security and wellbeing of the US. Arguably, and with good reason, it would be expected that the Department of Defense and not the Department of State should follow the National Security Council in this discussion. Historically, within the realm of international relations and world economic affairs, it was not until recently that the Department of Defense played a role at all - DoD was created in 1947 to fulfil the duties of military aid and co-operation. However, it is necessary to stress that the Department of State fulfils a major function within the procurement process for not only historical reasons but also as an organisational unit, within the decisional processes.

Under the US Constitution, the President has the authority to make treaties and appoint diplomatic and consular officials, to receive foreign emissaries and to exercise other authority provided by legislation (for example, Lend-Lease Acts, and aid to foreign countries). In 1789, Congress created the Department of State to assist the President in these duties, thereby replacing the Department of Foreign Affairs established in 1781. The Secretary of State was made the President's principal adviser on foreign affairs. The current machinery of the Department of State was developed after World War II when the global responsibilities of the US required a more complicated foreign relations operation. For example, the number of

Americans working for the Department of State rose from 6,000 in 1940 to 14,000 in 1984.[37] Other agencies were placed under the general direction of the Secretary of State; the most important here being the Arms Control and Disarmament Agency (1961) and the International Development Co-operation Agency (1979, to co-ordinate all foreign aid).[38]

The above is intended to raise the issue that foreign policy, as perceived by the Department of State, assists in determining the US roles in the world, and helps to shape the complementary military strategy. On the other hand, the military capabilities of the US impose practical limits on its implementation of foreign policy. Consequently, those who plan policy within the State Department appreciate those relationships and therefore work closely with their counterparts in the Pentagon to fulfil their functions effectively. More specifically, in the case of procuring a weapons system, the decisions regarding the system design must either compliment (or be legitimised to do so) the overall force structure and foreign policy of the US. For example, if negotiations conducted by the Arms Control and Disarmament Agency with other interested nations should precipitate a treaty banning all chemical weapons, and be ratified by the Senate, those companies involved in their procurement would find it difficult to secure funding. Another way to view this matter is to examine the case of the F-16 fighter aircraft which is co-produced by the US, Belgium, Denmark, Norway and the Netherlands, who are allies to the US. The F-16 is sold to Israel, Egypt, Korea, Pakistan and Venezuela (Iran under the Shah), aside from being in the inventory of its co-producers.

(It is assumed that General Dynamics would not be negotiating sales to North Korea or Vietnam.)

The Department of State is a major organisational unit. It assists in setting the parameters within which the Department of Defense and industry associated with military matters must operate. This is the proper way to view the relationship between the Department of State and the Department of Defense. In other words, the former is setting the limits on the other fulfilling the required material. However, this is not substantiated by the gross disparity in dollar amounts in their respective budgets. In Fiscal Year 1984, the total Federal Budget was $853.9 billion. The Department of Defense received $285.5 billion and the Department of State only $2.9 billion.[39] This is a contributing factor to the lack of literature regarding the Department of State's role in weapons procurement.[40] Probably the worst incident involved a report that was requested by President Carter in 1978, which reviewed the overall National Military Command Structure. The Department of State is not even referred to within the 79 page report.[41] However, it should be noted that the report was conducted by the Department of Defense. Perhaps this is explained as jealousy or inter-departmental rivalry, but a better description of this would be for the maintenance of the organisation, in this case, the Department of Defense.

Many Secretaries of State and the political appointees at the State Department could best be described as transients. Of the twelve Secretaries since World War II, only Dean Rusk remained for eight years; John Foster Dulles lasted six years; James Byrnes, George Marshall, Edmond Muskie and Alexander Haig endured for two years or less - Muskie left office after 8½ months, Haig left after 17 months. Although tenure arguably is an important aspect of decision making, prior preparation for such a post is just as, if not more, important considering appointees found little time for learning speciality skills and self-educational strategy once they were submerged in the general business demands of the post. Henry A Kissinger, who holds a Ph.D in political science from Harvard, was the only Secretary who had credentials[42] from a civilian university, which directly related to his political career choice.[43] Six other of the twelve were law school graduates.[44]

Aside from education, practical experience is also vital in preparation for such a job. Rusk had been Under and/or Assistant Secretary of State. Haig had been Senior Military Adviser and then Deputy Assistant to President Nixon for National Security Affairs from 1969-73 before becoming the Chief of White House Staff from 1973-74.

As mentioned above, many political appointees such as Under Secretaries are best described as transients - in fact, the turnover rate compared to the above was twice as fast. The subordinates to the Assistant Secretaries in charge of regional bureaux and their underlings, the Directors of Politico-Military Affairs, experienced a high rate of job turnover. Minimum tenure for every post was measured in months - a few favourites logged 4 to 6 years, but the average lasted less than 2½. Lags between incumbents to appointments of new members were several months long. The best illustration of this weakness of leadership at the Assistant Secretary level is evidenced in the case of the Bureau of African Affairs. This Bureau lacked an appointed Assistant Secretary for 12 consecutive years, from November 1946 to September 1958.[45]

The commitment (or lack of) of the upper rank "professionals" within the State Department is hardly conducive to the formulation of sound decision making. Moreover, even personnel policies applicable not only to the upper-rank professionals but also to the intermediate levels of the State Department's Foreign Service create bureaucratic inertia. All of the intermediate and upper rank are "expected to serve abroad for substantial portions of their careers". The Secretary normally seeks to assign every officer "to duty within the United States at least once during each period of fifteen years", but none of them "may remain more than eight continuous years unless the Secretary approves an extension ... because of special circumstances."[46] Easily understood is why many staffers of the State Departments play "musical chairs" as they move from one staff assignment to another in Foggy Botton.[47] Members of the Foreign Service spend nearly 60 percent[48] of their service in foreign countries.

Under the Constitution, the President has the final authority over US foreign policy. As chief foreign policy adviser and spokesman, the Secretary of State is responsible for executing the President's policies.[49] In turn, the Secretary is informed, advised and assisted by senior State Department officers, including the Deputy Secretary and five senior aides of Under Secretary rank.[50] This is the idealised case that is far too simplistic, which will become apparent following a discussion of the

Department of Defense and the relationships of those in authority and their subordinates. However, for the purposes here, in performing its functions, the Department of State :

- consults with other departments and agencies of the Executive Branch and with Congress;

- negotiates treaties and agreements with other nations.[51]

The performance of these duties is conducted at levels below the political appointees, where corporate memory is found. The staffs of the State Department and DoD must have some lines of communication, aside from the ones those in authority have, for example, within the forum of the NSC. Those in the Pentagon need to know about diplomacy in the same manner as those in the State Department have to know how military power fits into foreign policy. This is partly achieved through an exchange programme, in progress since 1961. There are cross assignments of a few Foreign Service Offices to the Pentagon for a period of one to three years. As well, "DoD civilians and middle ranked military men drawn from all four services benefit from duty with Statement Department bureaus for comparable periods".[52] Other forms of communication exist. For instance, staff members of Congressional Committees, whilst seeking information on both

Departments are criss-crossing that information between the Departments. Another important form of communication, suggested herein, is provided by weapons contractors, who strongly lobby, aside from Congress et al, both the State Department and DoD officials to enhance their position for weapons contracts, regardless of the stage of development of that system. More will be discussed later of the influences of contractors, lobbyists, outside institutions and so forth[53], but for now, from empirical evidence, this line of communication appeared to exist more on a dialy routine with subordinates in these Departments rather than those in authority.

The Department of Defense (DoD)

The present Department of Defense was created by the National Security Act of 1947, as amended. It has evolved through a series of amendments up to 1958, from a decentralised National Military Establishment of separate Military Departments to today's Department of Defense (DoD) headed by a Secretary of Defense with full authority and responsibility for its operation.

Although national defence planning, per se, takes place primarily in the Pentagon with the Joint Chiefs of Staff and all four military services providing input along with unified/special commands and assorted agencies, the Secretary of Defense (SECDEF) ideally steers that process from start to finish. He provides guidance, sifts through various proposals, and is ultimately supposed to make the final decisions. His Deputy, Under Secretaries, Directors and staffs participate in this process; taken together, they constitute the Office of the Secretary of Defense (OSD).

The Secretary of Defense generally exercises his command authority through the Joint Chiefs of Staff, who include the Chairman, the Army and Air Force Chiefs of Staff, and the Chief of Naval Operations. The Commandant of the Marine Corps participates with the Joint Chiefs of Staff on matters of direct concern to the Corps. Their primary function is to be the principal military advisers to the Secretary of Defense, the National Security Council (NSC), the President and also the Congress. The Office of the Secretary of Defense and the Joint Chiefs of Staff both provide staff assistance to the Secretary of Defense and, though separately identified and organised, are formally charged to function in full co-ordination and co-operation. More discussion concerning the Joint Chiefs of Staff takes place later in this Chapter.

Civilian control over the military has been a basic tenet of US Defence Planning since its inception. The National Security Act of 1947 prohibits the appointment of any person "as Secretary of Defense within 10 years after relief from active duty as a commissioned officer of a regular component of an armed force".[54] Even a second lieutenant or ensign is just as ineligible as a general or admiral. There was a single exception to this regulation. From 1950-51, Secretary of Defense George Marshall, who, although he had been a General in the Army, had received a special dispensation from Congress. However, Congress was careful not to permit his span in office to set a precedent.[55] Furthermore, the SECDEF's three principal lieutenants, namely, his Deputy, the Under Secretary of Policy, and the Under Secretary of Research and Engineering, may not "be appointed ... within ten years after relief from active duty as a commissioned officer of a regular component of an armed force."[56]

Policy direction is the primary responsibility of the Office of the Secretary of Defense (OSD). Such direction naturally encompasses all areas of the Department of Defense's (DoD) activities. That which relates to the National Military Command Structure includes the preparation of contingency plans and future force plans.

In the area of force planning, effective policy direction requires the statement of policy and objectives which can form the basis for military planning and from which are derived the DoD programme and budget. Because of the issue of jealousy or rivalry between the Departments of Defense and State (and the NSC), the overall direction for national security policy is to be generally considered to be within the realm of both Departments. Most military officers believe that more clear and definitive national security policy is needed for strategic planning.[57] If adequate national planning guidance is not given to military planners, they must prepare their own as a necessary starting point. The debate arises that national security policy is too general to be useful and with certainty it may be deduced that vague or all-encompassing statements of defence policy objectives are of little help in detailed force planning.[58] However, programmes constructed without clear policy directives can only be prepared on the basis of policy goals determined by the programmer himself, but often not made explicit for senior decision makers to accept or reject.

Aside from changes within the context of policy guidance (changes in force structure to meet different needs), policy guidance can arguably be said to have suffered from a lack of tenure and expertise of the Secretaries of Defense. As of 1987, fifteen SECDEFS have occupied the Pentagon's senior post since it was established in 1947.[59] The first four served for a total of five years; three, Eliot Richardson (114 days), James Schlesinger and Donald Rumsfeld, filled the post for 48 months from January 1973 to January 1977. A total of eight of the fifteen left the post after less than two years. Clark Clifford (1968-69) served only 10 months. Robert McNamara endured the longest, almost eight years (1961-68) but only three others (Charles Wilson 1953-57, Melvin Laird 1969-73 and Harold Brown 1977-81) remained one half that length. Aside from the SECDEF's lack of longevity (similar to Secretary of State), the SECDEF's Deputies have stayed in place for even shorter periods - 19 of them since May 1949.[60]

Beyond tenure, none of the civilian SECDEFs had any directly related formal education in conceptual planning of strategic analysis. Only one, James Schlesinger (1973-75) was even pertinently employed in the private sector as a Professor of Economics where he worked as a strategic analyst from 1963-69 with the RAND Corporation. Robert McNamara (1961-68), a former President of the Ford Motor Co and Director of Scott Paper Co, and Caspar Weinberger (1981-87), a former Director of the Pepsi Co and Director of Quaker Oats, had little knowledge, if any, of national defence in any phase before accepting the top position at the Department of Defense (DoD). Such a lack of expertise mandates on-the-job training before they could participate competently in the concept formulation process. However, this, coupled with such short tenure, would permit few to pass the primer stage before they stepped down. This leads to an inability amongst the top echelons to appraise proposed strategies with competence, thereby unavoidably increasing the chances of sound decisions emerging by accident rather than by design.

DoD Staff

Broadening the notion of tenure to staff at lower levels, an interesting point arises. When proceeding down the GS[61] scale within the DoD, the length of stay increases; thereby demonstrating that responsibility is inversely proportional to retainability (the same may be applied to the State Department).

The Secretary of Defense, a civilian, is a political appointee as are other Cabinet members, who serve at the pleasure of the President, subject to Senate confirmation. The President usually allows Cabinet members to pick their own teams which may be a lengthy process, especially the breaks between departures and arrivals during transition periods of changing Presidents.[62] In this case, the SECDEF picks his planning team, subject to Senate confirmation[63]; selects the planning structure he desires, within limits[64]; establishes procedures; sets standards; oversees the process; and approves products. As is the case with the SECDEF, the average longevity of all these political appointees within DoD is less than three years. For his Deputy, it is 1.8 years; for the Under Secretaries, it is 1.7 years, and so forth.[65]

Below the political appointee level are close to 440 military officers "on loan" to the OSD who remain a little longer. Three year controlled tours are standard and the extensions to tours, approved by the parent services, may not stretch to a total of more than four years.[66] "Corporate memory" must come from the 1,100 career executives[67], many of whom occupy the same or similar posts for a decade or more. Twenty year awards are not the exception. However, average retention rate is about 8 years. As mentioned above, and for the purpose of emphasis it should be apparent that the planners with the greatest potential opportunity to influence decisions have the shortest tenure.

Before continuing the discussion and outlining the formulation of policy within the Department of Defense (DoD), the author wishes to suggest a new conceptual approach of viewing those who occupy the top posts in DoD and hopefully apply it to the Department of State. According to Samuel P Huntington, ideally, "the Secretary of Defense is supposed to be policy- and strategy-minded, one who commands the admiration of the public, a man of experience, possibly having moved up from other posts in the Department of Defense or some equivalent branch of government; a man who should be concluding his career and thus not be in a position to use it as a stepping stone".[68] Realistically this is not the case - only one Secretary of Defense, George Marshall, had moved up within the ranks of the Department of Defense. An alternative perspective would be to evaluate one individual on their managerial skills accumulated from previous working experience. It is the author's contention that SECDEFs are managers of the bureaucratic organisation (DoD) in the sense of a large business firm or conglomerate. Their major concerns will be the maintenance and the performance of their organisation. These "managers" strive for a smooth decisional process, trying to play down internal political squabbling, and yet, when another outside organisation (for example , DoS) which may or may not be a part of the overall defence procurement process, appears, or is likely to infringe upon their organisation's jurisdiction, bureaucratic rivalry ensues to maintain one's standing. If such is the scenario, this then raises two issues :

First, considering Allison's Model II (organisational outputs) - the decision making behaviour of the Department of Defense, viewed as an organisational output, could then act as an input into the bureaucratic behaviour (Model III) between organisations concerned with overall defence procurement.

For example, the first Secretary of Defense, James Forrestal, used to say he "was not so much interested in an organisation chart as in the names of the men in the little boxes".[69] A fair observation. However, Paul Hammond correctly stated : "Men in Government - at least in the American Government - do not last. The things that last are the institutional arrangements which impart continuity to policy and meaning [however valid] to process, and the modes of thought which made both significant.[70] Thus, regardless of who runs the Department of Defense, the organisation is itself an influential factor not only in its performance, but also its performance with other organisations concerned with weapons procurement. But the organisation is comprised of the subordinates within DoD. Hence, the above argument, regarding who runs the DoD, should not be applied to those subordinates in the same manner.

Second, regarding DoD's performance with other organisations, if such a situation exists, this further insulates the decision making group (within DoD) "from the judgments of qualified associates who, as outsiders [for example, Department of State], are not permitted to know about the new policies under discussion until after a final decision has been made."[71] In other words, to avoid a confrontation with another group in defence planning, a certain group (for example, Office of the Director of Research, Testing and Evaluation) could perform its functions without necessarily informing other groups (for example, Department of State, NSC, et al). Further, this could be applied to within the Defense Department, where that same group could also continue its role in the process, and not be communicating every aspect and decision to the Secretary of Defense. Such leads to a lack of information that the Secretary of Defense might otherwise have. For example, the choice of the F-16 over the F-17 was made by the Air Force after their in-house work. The Secretary of Defense gave various reasons for its selection, one being its engine performance, unaware of the difficulties of the engine (known by the Air Force) which eventually led to crashes and a General Accounting Office inquiry. Also the Department of State, excepting the NATO connection, was not involved in that Air Force decision; and entered the scenario when the issue of foreign sales of the F-16 arose.

These issues will be discussed within the context of following a weapon system through the processes of

Fiscal and Life Cycles of a weapon system and within the discussion of the F-16 study. Here, the purpose is to identify the organisation and its actors, but the issues should remain in mind when viewing those at the top as managers. To test the approach of previous managerial skills, consider the following list of Secretaries of Defense since World War II :

FIGURE 2-I

Secretaries of Defense since World War II

		Civilian Jobs
FORRESTAL (1947-49)		Journalist, Businessman
JOHNSON (1949-50)		Lawyer
MARSHALL (1951-53)	(General in the Army) (Chairman of the JCS)	---
LOVETT (1951-53)		Banking Investment
WILSON (1953-57)		President, General Motors
McELROY (1957-59)		President, Proctor & Gamble Director, General Electric Director, Chrysler
GATES (1959-61)		Investment Banker Director, Scott Paper Co
McNAMARA (1961-68)		President, Ford Motor Co Director, Scott Paper Co
CLIFFORD (1968-69)		Lawyer
LAIRD (1969-73)		Lumber Business
RICHARDSON (1973 (114 days))		Lawyer
SCHLESINGER (1973-75)		Professor RAND Strategic Analyst
RUMSFELD (1975-77)		Investment Banking

BROWN (1977-81)	Professor College President
WEINBERGER (1981-87)	Lawyer Director, Pepsi Co Director, Quaker Oats

Twelve of the fifteen Secretaries of Defense, if including the lawyers, would have had direct managerial experience in their previous jobs. Based on empirical evidence and personal experience, the lawyers or the attorneys would have accumulated managerial skills as partners of their respective firms.[72] Further, law firms in Washington are sometimes referred to as "powerhouses", because a great majority are involved in lobbying efforts. These powerhouses are usually quite large, sometimes national as well as international firms, and a large portion of the partners' time is devoted to the overall management of the firm.[73] Secretary of Defense Brown may also have acquired some managerial skills as a College President, bringing the number to thirteen. It cannot be overlooked that Secretary of Defense Schlesinger may have depended upon managerial skills as a Professor, but very likely his seven years service as a strategic analyst with the RAND Corporation provided him with a strong foundation in managerial ability. The remaining Secretary of Defense Marshall (1950-51), who served in the Army in World War II, is the non-civilian on record to have held the post of Secretary of Defense.[74]

It is obvious that the majority of the serving Secretaries of Defense (13 out of 15), receive high marks for having developed managerial skills in their previous and often prestigious career posts. In contrast, only two had qualifications in defence planning. It would be prudent, at this stage, to see if the same pattern emerges in an examination of the individuals holding the Secretary of State post since World War II.

FIGURE 2-II

Secretaries of State since World War II

		Civilian Jobs
BYRNES (1945-47)		Lawyer
MARSHALL (1947-49)	(General in the Army) (Chairman of the JCS)	---
ACHESON (1949-53)		Lawyer
DULLES (1953-59)		Lawyer
HESTER (1959-61)		Journalist
RUSK (1961-69)		Professor, College Dean President, Rockefeller Foundation (1952-60)
ROGERS (1969-73)		Lawyer
KISSINGER (1973-77)		Foreign Defence Policy Professor; author and consultant; Study Director, Council on Foreign Relations
VANCE (1977-80)		Lawyer
MUSKIE (1980-81)		Lawyer; Senator
HAIG (1981-82)	(Army, SACEUR)	---
SHULTZ (1982-)		College Professor Business Executive

Evidently, the same appears to apply - out of twelve Secretaries of State, two had direct involvement with management at the corporate level; and using the same criteria for attorneys[75], as in the case of the Secretaries of Defense, six of the Secretaries of State were attorneys and should be added to the previous managerial skills category, bringing the tally up to eight members.

Kissinger, like Schlesinger, may have exercised managerial skills as Professor, but heavily relied upon managerial duties to perform as a consultant, and as a member of the Council on Foreign Relations. Though the argument for Kissinger is weak, it should not be entirely dismissed. It is equally hard to make assumptions regarding the sphere and practice of managerial experience that Hester would have exercised as a journalist; and the remaining two, Marshall and Haig, both enjoyed a military oriented background. Therefore, 66 per cent (8 out of 12) of the post World War II Secretaries of State relied heavily upon managerial skills from career posts previous to their appointment as Secretary of State, while 33 percent (4 out of 12), Kissinger, Marshall, Haig, and Rusk (who had also been Under Secretary of State) had backgrounds and expertise in the field of defence planning.

Since the majority of these gentlemen share a common bond of managerial expertise, it can be established that tenure can be eliminated as one of the supposedly adherent considerations in the realm of the decisional processes of a weapon system. Primarily, an individual chosen for his managerial skills applies his knowledge by organising his department accordingly. In comparison, an individual who is chosen for a position and lacks managerial skills has to somehow attempt to balance the command of his post, while simultaneously developing an effective factual base of managerial discipline. In essence, he is prepared upon arrival to manage the operation based upon his own preferences, which have been shaped by past experience and practice. This is not to suggest that he as an individual cannot influence - he does - but he does so based on his accumulated managerial experience and skills. For example, Robert McNamara changed the contracting of weapon systems to include a "contract definition". McNamara felt that some of the uncertainties inherent in a weapon system might be reduced before committing large sums of money to it. McNamara's reforms introduced the cost-benefit analyses of major systems to the procurement process, which would have been a facet of business decision making at the Ford Motor Company and Scott Paper Company. Simply, the point being made here is that those at the top are more concerned with managing the overall organisation based on their personal managerial preferences. If a campaign to reveal the seeds of a new weapon system were launched, certainly the least likely source for investigation would be the upper echelons of authority. Second, given the complexities involved in the decisional processes of the life cycle of a given weapon system, it is easily understood why those in privileged positions are not even cognisant of many systems until it involves the organisation itself or the total procurement apparatus within which the organisations operate. For example, prior to Congressional awareness of the F-16 programme, and at the time the DoD was preparing to make a first announcement about the programme (1972), in its preparation of its budget, $30 million had already been spent from Research and Development funds for the F-16.[76] Obviously, a threshold of investment had been realised and the time had come for the DoD as an organisation, to enter into the arena with Congress, as an organisation, for the bureaucratic battle of the F-16. In this case, and for the sake of argument concerning weapon systems, decisions in the early stages emanate from lower stations of authority.

At this stage, it is necessary to proceed with the formulation of policy within the DoD and address other relevant organisations and actors involved in defence planning.

The Formulation of Policy within the Department of Defense

In formulating policy, the National Security Act of 1947 prescribes an Armed Forces Policy Council (AFPC), chaired by the SECDEF who has "the power of decision". His Deputy, the Service Secretaries, the Joint Chiefs of Staff (JCS) and the Under Secretary of Research and Engineering are charter members. Their mission is to "advise the Secretary of Defense on ... broad policy relating to the armed forces" and to undertake other tasks that he may direct.[77] Today, the Armed Forces Policy Council (AFPC) meets each Monday with 20 to 25 top echelons and their assistants to formulate policy. However, the participants pay little attention to defence planning. The Under Secretary for Policy (USDP) who, on paper, is supposed to assist the SECDEF in integrating "departmental plans and policies with overall national security objectives", does not even take part. Apparently management is the main topic that is discussed at these meetings, with additional special interests in the subjects of manpower, money matters, and legislative affairs.[78] This information further substantiates the proposal that these gentlemen are interested in expanding upon their managerial expertise. Due to the Departments' preoccupation with managerial strength, there was very little input received from other defence agencies thereby necessitating the initiation of a broader decision making body - the Defense Resources Board.

The Defense Resources Board (DRB) was created in 1979 with six charter members under the SECDEF's Deputy. However, in 1981, under SECDEF Caspar Weinberger, the DRB membership escalated from 7 members to 16.[79] The rationale behind the formation of the DRB was to ensure a much better alliance between the Service Programme Objectives Memoranda (POM) and budget submissions[80] to Congress so as to resolve "as many issues as possible on a mutually satisfactory basis without Secretary of Defense intervention ...".[81] The Deputy SECDEF is still listed as Chairman. Staff support comes from his Executive Assistant, who serves simultaneously as Executive Secretary for the DRB. In his capacity he prepares schedules and agendas, establishes procedures, helps to select issues and prods and encourages staff members to complete unfinished business.

The body of the Defense Resources Board (DRB), aside from the JCS Chairman, is completely comprised of civilian political appointees. Furthermore, 11 out of the 16 members are from the Office of the Secretary of Defense (OSD), thereby ensuring an OSD majority. One half of the members are managers with narrowed outlooks. This is the case because each holds vision in terms of a specific Service (Army, Navy, Air Force, Marine Corps) or a particular function (manpower, money, material). From the "piecemeal attention" that a wide spectrum of conceptual problems have received, the Under Secretary of Defense for

Policy is then tasked with pulling the whole DRB process together.[82] He takes the lead in developing defence policy guidance that deals with threats, opportunities, objectives, policies, strategic options and associated free planning. Also, his two principal subordinates, the Assistant Secretaries for International Security Affairs (ISA) and International Security Policy (ISP), assist him with that burden. However, although these three gentlemen have an enormous responsibility, they are still answerable to the DRB Chairman, the Deputy SECDEF, and his Director of Program Analysis and Evaluation (PA & E).[83]

There is no document to date that specifically delineates the Defense Resources Board's (DRB's) mission and functions in any detail. However, such functions may be implied from memoranda providing instructions to its members.[84] SECDEF Caspar Weinberger expanded the original charter almost immediately upon assuming office to promote "a more disciplined planning process".[85]

The corporate direction of the DoD's entire planning, programming and budgeting system (PPBS) presently lies within the DRB. A previous Chairman and Deputy SECDEF, Frank Carlucci, put the DRB in the "concepts business" as never before[86], with implicit instructions to measure requirements against realistic goals and threats, to estimate the risks when ends and means refuse to match and recommend adjustments for consideration by the SECDEF.[87] The DRB concentrates on major issues and also secondary concerns that the OSD staff and Military Services cannot settle. Such a procedure contrasts sharply with the past practice of flooding the system with paper. For example, the Fiscal Year (FY) 82 Program Objectives Memorandum (POM) requirements produced "2,691 pages of text and tables".,[88] which, aside from taking interminable time to produce, would more importantly make proper appraisal impossible.

Members of the DRB attempt to reach a consensus before the Board. However, disputes arise and in that case the Chairman of the DRB takes on the role of adjudicator. Furthermore, he may oppose the majority opinion, if the conclusions of the majority seem counter to Administration/Departmental policy - final resolution in such cases rests with the SECDEF, who either reinforces or overrides his Deputy. Within this special relationship between the SECDEF, Deputy SECDEF and other DRB members, it has been demonstrated that some DRB sessions simply show the Chairman and SECDEF where members stand on important issues and that they have the strength of their convictions.[89] However, many sessions do lead directly to decisions that appear in Program Decision Memoranda (PDMs) and Defense Guidance documents.[90]

The members of the DRB are better prepared to cope with defence programmes and budgets than with policies and concepts. To correct this situation, Caspar Weinberger briefly considered having two boards - one for programmes, another for policies - but discarded the idea because it would put inseparable planning components in separate compartments.[91] The DRB tries to put strategic requirements and resources on the same plane which is a deliberate departure from the past practice of following SECDEF McNamara's reported belief that the "best alternative is invariably a matter of choosing the most appropriate economic criterions."[92]

As mentioned above, the only non-civilian charter member of the DRB is the Chairman of the Joint Chiefs of Staff (JCS). He and his support staff provide little competition for the 1,800 OSD and Service counterparts. Because of this, "unofficial officials", namely, the Service Chiefs, also attend most DRB sessions and are situated behind their respective Secretaries (Secretaries of Navy/Army/Air Force/ Marine Corps) and help to provide valuable professional military insights not usually available from the civilian members.

Above is mentioned a military input into defence planning, but although important, it is not as effective as perceived. The Joint Chiefs of Staff (JCS) not only play a role in the Department of Defense but also advise the President and the National Security Council directly. However, the JCS military inputs into the Defense Resources Board could be more important as a litmus test for civilian response. This raises the issue of strategies on the part of the producers of various weapon systems. For example, these "professional military insights" could be constrained not only by the civilian members of the DRB or the Office of the Secretary of Defense, but also by the fluctuations of policy emanating from the Department of State and the National Security Council or even the President (for example, changes in policy regarding the B-1 bomber). It is important to mention this here before any discussion of the Joint Chiefs of Staff, because in pursuance of any weapon system its producer must strive to strike the right balance between all of the defence related organisations and much of that may even be by chance.[93] For example, a weapons contractor would be at risk if he were to work solely with the Joint Chiefs of Staff whilst neglecting other civilian members of the DRB or the NSC, or DoD Components, et al.

Further, the contractor must be aware not only of the ongoing work and research of each and every defence related organisation, but also which of those organisations are presently yielding more influence depending on the weapon's stage of development. The message is that the whole process is highly compartmentalised, complicated, and judgments as to one group being more important than another need to be specific to particular contexts. For example, a small Research and Development Group within the Air Force may have more influence on a given system than the Joint Chiefs of Staff. The author is not suggesting that they are equal - they are not. The point is that in weapon systems, not only is the process to obtain them costly and complicated but, given the acquisition cycles, discussed below, the decisional centres shift during the various stages of development. At this stage, other relevant actors/organisations must be identified and discussed.

Joint Chiefs of Staff (JCS)

"The Joint Chiefs of Staff are the principal Military Advisers to the President, the National Security Council and the Secretary of Defense."[94] The foremost function of the JCS which was accorded to them by the National Security Act of 1947 is to "prepare strategic plans and provide for the strategic direction of the armed forces".[95] The JCS is comprised of 15 members, each representing a Service (Army, Navy, Air Force, Marine Corps) and the "purple suited" Chairman of the Joint Chiefs of Staff, who is supposed to be completely free from Service assignments.

The Joint Chiefs of Staff were formed during World War II for combined strategic planning with their British counterparts. Their legal status and functions were formalised by the National Security Act of 1947. An underlying principle of the 1958 Amendment to that Act, as proposed by President Eisenhower, was that, "... separate ground, sea and air warfare are gone forever ... our country's security requirements must not be subordinated to outmoded or single-service concepts of war".[96] In accordance with the amendment, a Service Chief's duties as a member of the Joint Chiefs of Staff take precedence over all his other duties. However, problems inherent in the dual roles of the Chiefs, as both the military leaders of their Services, and members of the Joint Chiefs of Staff charged with providing military advice that transcends Service positions, were recognised in the 1958 amendments.

The 1958 Amendments to the National Security Act of 1947 made provisions for the creation of a Vice-Chief of Staff for each Service respectively. The Chiefs were instructed to delegate Service related duties to the Vice-Chiefs. This reduction of duties to the Vice-Chief helped assure that the Chiefs had an adequate time allowance to attend to their joint duties and obligations.

There is often a great deal of speculation and confusion regarding the role of the Joint Chiefs of Staff, their function, and their place in the order of command. From a legal standpoint, the Chiefs of Staff are excluded in the order of the chain of command as it passes down from the Executive Branch. The President passes control to the Secretary of Defense, who in turn, dictates to the Unified and Specified Commanders. These Commanders have direct authority over all of the forces assigned to them.[97] The Joint Chiefs of Staff act as the military staff to the Secretary of Defense for operational direction of those forces. The military Departments (Navy, Army, Air Force, Marine Corps) are not in the chain of command. They are responsible for the administration, training, and supply of the forces which are assigned to the Unified and Specified Commanders. Presently there are five Unified Commands and three Specified Commands, merging together to make up what is known as the Unified Command Plan. A Unified Command is a command composed of significant forces from two or more Services.[98] The Unified Command Plan defines the organisational structure and responsibilities of the various commands, under which the Nation's combatant forces receive direction from the National Command Authorities.[99]

The Joint Chiefs of Staff take on more of an advisory role in the proceedings of the procurement process. Their counsel regarding matters such as personnel, material, et al, is important in establishing or maintaining a command. Consequently, if the means do not coincide with the needs of those in the chain of command, then the Chiefs must perform as a sounding board. Given that the Joint Chiefs operate in an advisory role to their civilian colleagues (President, Secretary of Defense, et al), there must be a military connection at work. The contact is made through the component commander, who provides the necessary information (men, material) to the JCS. A Unified Command is led by a Unified Commander (Commander-in-Chief)(CINC), who has, reporting to him, a component commander for each assigned Service element. For example, at EUCOM there are the Commander in Chief and three component commanders : one for US Army, Europe; one for US Naval Forces, Europe; and another component commander of US Air Forces, Europe. Component Commanders report to the Commander in Chief (CINC) on operational matters but also directly to their military departments on matters of personnel and material support. Each Chief is responsible to the Secretary of his Department, (Chief of Staff for the Air Force is responsible to the Secretary of the Air Force) for the "management and military leadership of his individual Service in its mission of organising, training and equipping its forces" [emphasis added].[100] The Chiefs have responsibility for administering an organisation and budget larger than any American commercial enterprise. Since 1958, the advent of the Planning, Programming, Budgeting System (PPBS)[101] has imposed greater demands in the management of his Service, thereby increasing a Service Staff to over a thousand officers to assist him in this role. This same staff also supports him in his role as a member of the Joint Chiefs of Staff.

Considering that the Joint Chiefs of Staff are not in chain of command, but are responsible for the organising, training and equipping of the US Armed Forces; and given the size of the organisation of each Service which each Chief is responsible for; it is the intention herein to treat them as managers. In a sense, each Chief manages his individual Service whilst undertaking the management of the overall US Armed Forces in the role of Chiefs of Staff. This leads to the first of four problems which impair integrated defence planning on the part of the Joint Chiefs of Staff. They are :

(1) Legal restrictions
(2) Competition with Military Services
(3) Competition with Each Other
(4) Competition with the Office of the Secretary of Defense (OSD)

(1) Legal Restrictions of the JCS

Law demands that "the Joint Staff shall not operate or be organised as an overall Armed Forces General Staff and shall have no executive authority", but may be shaped "along conventional staff lines to support the Joint Chiefs ... in discharging their assigned responsibilities."[102] "Conventional staff" are never defined in the National Security Act. There are specific provisions in the Act which clarify the intent.

Moreover, no law or Secretarial directive dictates how the Joint Chiefs of Staff should conduct their business, nor what the relationship should be between the Joint and Service Staffs. The Chiefs themselves determine how their staff will interact and to this end have issued a series of procedural directives covering the processing of JCS actions. Furthermore, the Act indirectly forbids a "Defense Chief of Staff" - the JCS Chairman outranks "all other officers of the armed forces" but, because he may not exercise military command over the (other) Joint Chiefs of Staff[103], he lacks power to solve disputes or make JCS decisions, even under the supervision of the Secretary of Defense. However, he may act for the Joint Chiefs of Staff in time sensitive operational matters. For the most part, his uniqueness is derived from the other Chiefs by representing the Joint Chiefs of Staff in the deliberations of the National Security Council. Thus, in the ideal sense, he becomes a close personal adviser to the Secretary of Defense and the President, which is the source of his influence on the other Joint Chiefs.

The Law also forbids a large Joint Staff. Congress originally allowed no more than 100 officers which was raised to 210 in 1949, then allowed 400 in 1958 (the present limit). Also, an additional 280 officers assigned elsewhere in the Office of the Joint Chiefs of Staff (OJCS) do not count against the statutory ceiling.[104] The Office of the Joint Chiefs of Staff (OJCS) supports the Joint Chiefs of Staff. The OJCS includes the statutorily limited Joint Staff (mentioned above), the Office of the Chairman and Joint Chiefs of Staff agencies. The Joint Staff is headed by a Director, who is selected by the Chairman in consultation with the other Chiefs and approved by the Secretary of Defense.

The limit of tenure is also legally restricted which frustrates attempts to produce a core of trained planners to advise the Joint Chiefs with continuity and competence. During peace time, the Act restricts the three-star Director and other commissioned officers to a maximum tour of 3 years; thereafter the Director may not return in any capacity to the OJCS. The other officers may resume Joint Staff duty, less than three years <u>after</u> departure, only with the approval of the SECDEF - the number of returnees granted that special dispensation must never number more than 30 at any given time.[105] Therefore, no corporate memory, similar to that within the confines of the OSD with its career civilian bureaucrats, exists within the OJCS. This is a further reason for the JCS dependence on the Services or DoD Components.

Aside from the legalities restricting tenure, there are some extra-legal aspects which hamper the Joint Staff in performing creditably. Historically, duty on the JCS has not been high on the list for success in a military career - in fact, it is the opposite.[106] The unwillingness of the Services "to heed the pleas of various Secretaries of Defense and Chairmen of the Joint Chiefs of Staff to assign their most highly qualified officers to the Joint Staff ... the Services have not perceived such duty as being of the highest priority and have made their personnel assignments accordingly."[107] Moreover, it has been stated that many of the best officers avoid any Joint Staff assignment if at all possible.[108] "In consequence, while the Joint Staff officers are generally capable, the very top officers of the Services more frequently are on the Service staffs."[109] It would appear that, in general, fewer officers, at any level are interested in seeking JCS assignments. This is evidenced by the average length of tour reduced from 3 years to 30 months. Generals and Admirals in leadership slots tend to move on after 24 months.[110] Considering that the JCS planners require the fusion of land, sea and air warfare expertise, it is expected that vested interests of individual services should be secondary to them. Short periods of tenure encourage the practice of JCS officers requiring Service Staffs to draft complex JCS papers for them.[111] Engagement in a practice such as this allows vested interests to frame the initial issues and the terms of reference from which the JCS will work. Corporate memory, as established within the Department of Defense, and instrumental for long term defence policy guidance, appears to emanate from lower levels, and also has its effect on the JCS.

(2) Competition with Military Services

On paper, the JCS allegedly give their common interests precedence over their Service interests.

Four out of five members must maintain this dual balance by giving allegiance to the JCS and their parent Military Service. Only the Chairman, who is free from Service assignments, is able to concentrate on joint problems. However, even his "job is complicated by ... a dual set of loyalties. He is the spokesman for the military but he is also the President's and the Secretary of Defense's man. To hold their confidence he must retain that of the Joint Chiefs."112]

Although joint responsibilities are to take precedence, in practice primary loyalty almost invariably remains with the respective parent Services, which provide top officials a political power base that no "abstract entity" like the JCS can duplicate.113] The JCS have no formal to semi-formal affiliates such as Associations of the United States Army and Air Force or Navy and Marine Corps League.

> "In general, [the Joint Chiefs of Staff] has handled operational and most planning matters quite well. On the other hand, the nature of the organisation virtually precludes effective addressal of those issues involving allocation of resources among the Services, such as budget levels, forces structures, and procurement of new weapons systems - except to agree that they should be increased without consideration of resource constraints."114]

It is no wonder then that political and industrial pressure groups can gain much more from the Services than they can from the JCS in terms of monies for weapons procurement and military installations.

Under pressure of this degree, it is not difficult to understand that each Service Chief of the JCS constantly finds himself in a dilemma when promulgating planning or decisions. A Chief cannot, for example, be expected to argue for additional carriers, divisions, or air wings when constructing a Service budget, and then agree in a joint forum that they should be deleted in order to make provision for programmes of other Services. Agreement with his Service could curtail his rapport with his JCS counterparts, but disapproving proposals by his Service, even one time, could cost him permanent loss of that Service's confidence in him.

In an attempt to avoid such a situation, decisions tend to be made amongst the Services where trade-offs and bargaining occurs, and the recommended decisions are almost guaranteed during JCS review. The principal casualties of this system - joint plans and programmes - are supposed to be the raison d'etre of JCS activities. However, such is not the case.[115] The Joint Chiefs of Staff do attempt to assess the military risk involved at various programme levels and force compositions. While this is a necessary function, arguably it is not a substitute for joint military advice on the preparation of constrained force structure options.

Furthermore, if inter-service squabbles should surface during a JCS review, the Chairman of the JCS can only appeal to principle and apply indirect pressure. He can do little more because, as mentioned above, the law forbids a "Defense Chief of Staff ... He may not exercise military command over the [other] Joint Chiefs of Staff."[116]

(3) Competition Among JCS Members

"Free play of contradictory Service viewpoints among the Chiefs ... permits, indeed encourages, issues to be aired thoroughly ... and ... a certain amount of inertia probably helps prevent half-cocked decisions."[117] However, rivalries over missions and money increase dual hat difficulties.

Although inter-service competition for resources and spheres of influence is often severe[118], inter-service rivalries often water down plans within the several Services, which are in a sense coalitions. Three Navies (surface, sub-surface and air) plus a Marine Corps, for instance, compete for power within one Department. Strategic Air Command (SAC) and Tactical Air Command (TAC) fight for funds in another - and so on. Negotiated compromise muffles many or most positions long before Joint Chiefs even begin to consider them.[119] Furthermore, the four Service Chiefs depend primarily on their staffs to prepare them for joint meetings. Joint planners seldom brief them and, as mentioned above, often allow the Service staffs to draft papers setting the issues and framing the arguments. That practice subverts the joint process, because it slants subsequent deliberations; "the net effect tends to be a projection of Service ... positions rather than an emphasis on the joint interest".[120] However, it is not only a projection of the Service, but also a protection of the Service.

Considering that the Chiefs split so consistently along Service lines, it is important for the Chiefs to appear to share unanimous voting. During splits, debating teams in the JCS try to drive hard bargains but if they fail, backscratching is the popular alternative. "The Chiefs can always agree on more for everybody, and since this is the path of least resistance, it is often taken."[121] It is imperative for the JCS to reach unanimous decisions for two reasons: first, monolithic military opinions reinforce JCS pronouncements, especially as perceived by Congress, the American public, US Security partners and US opponents. Second, they also present the pressure of a solid front to the Secretary of Defense who might otherwise deal with unsettled issues in ways that would displease every Service.

On the other hand, the pressures on the JCS to appear harmonious in their decisions also impedes defence planning. For example, JCS action officers prepare drafts, then request "concurrence" (not simply co-ordination or comment) from opposite numbers on Army, Navy, Air Force and Marine Corps Staffs. Rewriting and recycling is the rule - papers more often than not repeat that process several times, seeking approval at successive levels. "Each Service has a de facto veto on every issue at every stage" of that process, which takes 18-24 months to complete for major plans.[122] The suggestion herein is that at the end of the day, such a system produces reports representing the lowest common denominator, expressed in the least precise language, so that all Chiefs can meet on common ground. Line-by-line amendments reduce clarity and continuity; procedures take precedence over substantive content, which is frequently riddled with ambiguity.[123] The military style of writing is often "foreign" and tends to reduce their acceptance among the civilian consumers.

This claim is best demonstrated in a report, referred to as the Joint Strategic Objectives Plan, also known as the annual Joint Chiefs of Staff Plan, which provides their recommendations for future military strategy and mentions the appropriate forces necessary to carry out national security policy and objectives at what they interpret to be a prudent level of risk. This document has been criticised for being too remote from fiscal reality ("a wish list") and too voluminous to be useful to the Secretary of Defense and the President.[124] Consequently, it is not read by the audience for whom it is primarily intended. On balance, the annual JCS Plan establishes a benchmark which the Joint Chiefs of Staff can use as a reference point in assessing the risks of various programme and budget alternatives as mentioned above. However, arguably it would appear that the JCS Plan is of more value to the Joint Chiefs of Staff than to its intended consumers.

A second aspect of the JCS annual plan and other JCS papers is the role they play in changes of approach to strategy, organisation of commands, roles and missions of the Services and other issues of similar concern. For example, if a Service interest, such as the control of close air support to ground forces, arises, the changes are "initiated only when the pace of technological change on Secretarial [Secretary of Defense] directives force it,"[125] which may be related to inherent military conservatism. Changes in such an area are greeted with reluctance.

As in any field, there is a tendency to be comfortable with what one not only understands but, more importantly, especially in weaponry, with what one is confident will operate successfully. On the other hand, there tends to be a natural scepticism to accept theoretical assertions of improvement. More succinctly, this tendency has been labelled fighting the last war over again. Warranted conservatism, which permeates Joint Chiefs of Staff reports, stifles innovative ideas. At best they are concerned with the maintenance of the status quo. The best strategy for a weapons contractor with a new idea or technological advance wishing to fund research is "best off knocking on Pentagon doors with little or no brass."[126] "Many of the now-classic arguments about representative bureaucracy may be more applicable at the lowest level of organisations than at the senior level, for it is the lowest-level administrator whom the clients actually meet ...".[127] As seen in their civilian counterparts, decisions within the Pentagon arguably appear to travel upwards - the case study of the F-16 fighter will demonstrate this point.

Aside from the above, one of the most pernicious results of this compromise process "has been the inability of the JCS to present their cases in the precise, sharply focussed way which most Secretaries of Defense have sought."[128]

<u>(4) Competition with the Office of Secretary of of Defense (OSD)</u>

The Joint Chiefs of Staff by law advise the Secretary of Defense, who may accept or reject their professional opinions as he sees fit.[129] The compulsion of the Joint Chiefs of Staff (JCS) to present the appearance of a solid front despite deep-seated differences is a self-inflicted wound to the JCS in its relationship with the Office of the Secretary of Defense (OSD). The Joint Chiefs seldom submit pros and cons of serious options for the Secretary of Defense to compare, and therefore the OSD civilians are called upon to fill this vacuum and develop alternatives, provide rationale for recommendations, thereby ultimately becoming the final arbiters when the Secretary of Defense decides what strategy and supporting force posture it is best to assume.[130]

Another self-inflicted wound to the JCS was its professional snobbery. The JCS, who had operated semi-independently since 1942, resented civilian intrusion in military matters. "It took many years" to realise that "they should basically serve the Secretary of Defense" and be "responsive to his interests and concerns, and ... provide him with advice and analysis that is specifically relevant to his needs and wishes."[131]

This attitude encouraged the Secretaries of Defense to seek assistance from civilian strategists, which was exacerbated by the fact that, although there was little competition from the OSD staff for the first 14 years (1947-60), sceptical civilians armed with new analytical tools began to advance alternatives soon after Secretary of Defense Robert McNamara took office.[132] "The major effect of McNamara's innovations was a fundamental shift in political design of organisation and process. For the first time, OSD became an effective player in the weapon system acquisition process, positioned to challenge Service dominance of that process."[133] They and their successors have been making US military planning ever since. For example, "Packard returned day-to-day program management to the Services, but sought OSD essential management control through the definition of milestones - key decision points ... which would permit program review by OSD."[134]

OSD programme specialists will likely retain that power until the JCS planners start relating superior concepts to resources but such is not a self-inflicted wound, it is a structural fault.

The Joint Chiefs of Staff prepare "strategic plans". However, they are not organised or equipped to connect those plans with programmes and budgets, which "are developed through dialogue and debate betweeen OSD, the President, NSC and the Services".[135] Decisions pertaining to Planning, Programming and Budgeting System (PPBS) are made by the Secretary of Defense under the authority granted by the Defense Reorganisation Act of 1958. That legislation gave the Secretary of Defense, under the policy guidance and direction of the President and the National Security Council, two distinct lines of authority :

1) <u>A direct line of authority</u> was established through the Joint Chiefs of Staff to the unified and specified commands. Through this command line, the Secretary of Defense issues decisions regarding threat appraisal, strategy and force structure;

2) <u>An administrative line of authority</u> for the control of the military departments and for the management of military forces which was established through the Secretaries (civilian) of the Military Departments. Through the administrative line of authority, the Secretary of Defense issues decisions regarding programming of resources to support existing force structure and also the budgeting of annual funds to support programmes.

Consequently, JCS pronouncements play a subordinate part in the Planning, Programming, Budgeting System (PPBS). "The JCS in their corporate capacity do not appear to play a crucial role in the final process of allocating the defense budget."[136] Even though the planners for the Army, Navy, Air Force and the Marine Corps, who deal with concepts, programmes and budgets as part of an integrated package hold a stronger position, they still have serious problems. Their parochial products, compiled in separate compartments, do not adequately address joint demands. The Secretary of Defense therefore falls back on civilians in the OSD Program Analysis and Evaluation (PA & E) who have found favour for more than 20 years as the architects of joint strategies relating to the available means. Systems analysts without any official command authority "seldom differentiated between line and staff roles for much of that period, riding roughshod over military men."[137] Moreover there is military resentment of civilian analysts at the OSD. Comments like those from Air Force Chief of Staff Thomas D. White who scorned "pipe smoking defense intellectuals" who are "often over-confident, sometimes arrogant ...", ring of such resentment.[138]

The Reagan Administration has reduced the powers of the Office of the Secretary of Defense Program Analysis and Evaluation and improved its relationship with the uniformed competitors.[139] Nevertheless, civilian programmers will continue to dictate US military planning until the Joint Chiefs of Staff strengthen their abilities to participate in the PPBS process.

In summary of some points made earlier, the Joint Chiefs shall be viewed as managers based not on their previous experience before assuming the position but on their role in the overall organisation. It has been established that they are not in the chain of command but act in an advisory role to their civilian colleagues (for example, the Secretary of Defense). Furthermore, each Chief is responsible for the management of his individual Service in its mission of organising, training, and equipping its forces. However, the discussion of the last few pages has complicated the issue. It is too simplistic to assume that their decisions are based on or derived from their sound managerial skills whilst overseeing their Service and their joint responsibilities. They are politicians - politicians in the scheme of bureaucratic politics. They are part of the pulling and hauling that is the essence of politics, the backscratching, and trade-offs et al. In a sense there is a real dual set of loyalties, each intertwined with the other, hoping to advance decisional output in favour of their Service, the overall military establishment or for themselves. Each tends to discredit the other. For example, were the decisions involved in procuring the F-16 purely managerial or politically motivated? Such an exercise would be fruitless because ultimately it is impossible to separate the two. A member of the Joint Chiefs of Staff does not have two in-trays, one for managing his organisation and the other concerned with the political consequences, but he does have both elements operating simultaneously in his decision making. Moreover, the point is not that decisions made within an organisation are simply managerial - they are political as well. In essence, this is the "Catch-22" which Allison attempted to evade. Allison's Model II based on Governmental action as organisational output from standard operating procedures clashed with his

Model III known as Government or Bureaucratic Politics model based on Governmental action as a political resultant. However, the suggestion is an approach that Government action as a political resultant may also act as an input to government action as organisational output. In other words, aside from Model II influencing Model III, the opposite also applies. Moreover, Allison's Model I of the Rational Actor is at times both influencing Models II and III. Essentially, Allison's three paradigms are useful as long as a specific decision is viewed along all three lines. However, it is incorrect to accept one model and discount the other two when viewing a specific decision. Indeed, there should be no distinction or categorising for such practice often blurs decision making because an individual's perceptions of the events differ. It is the opinion, herein, that Allison fell into the trap of what Herbert Simons referred to as Bounded Rationality - the impossibility of the human mind to systematically address the complexities of the real world. It is to simplify reality in one's mind to a sufficient degree; however, increasing simplification makes perception a less accurate representation of a more complicated reality.

Weapons procurement decision making is a very complicated process involving millions of people and billions of dollars. Also, given the uncertainties inherent in a weapon system itself, decision making has to be viewed en masse for each weapon system procured, but there should be some common trends applicable to almost all.

Congress at Its Weakest

"Congress, cast in the role of resource allocator and concept critic, does not participate directly in the defense planning process".[140] However, Congress' authorisations and appropriations shape defence planning. Further, its oversight authorities provide Congress with leverage to influence defence planning by exercising constraints on the Executive (for example, War Powers Act of 1973),[141] and on other defence related agencies (except the NSC) and organisations. Also, senior military officials and civilians in the State Department and DoD can take office only if confirmed by the Senate. Essentially Congress remains a "reactive participant in the process" of defence planning and policy initiative is "exercised by Congress only spasmodically".[142] Of course, "the checks and balances system assures that Congress also plays a role [in defence planning] but this system is weaker here than anywhere else."[143]

Congressional "incapacity to determine force levels and strategic programs is often attributed to the lack of proper information and technical competence".[144] This is a contributory factor, however, another reason for Congress' inability to act effectively "derives primarily not from its technical failings but from its political ones"[145] as well.

In regard to the political failings of Congress - the initiation of programmes and the authorisations and appropriations of them are highly political decisions involving conflicting interests and groups. Congress and the Congressional Committees concerned with defence related issues (refer back to footnote 95 in Chapter 1) further fragments defence "programs because the interests which are primarily concerned with those programs are not adequately represented in any Congressional body".[146] The various committees, in one way or another, are involved in the process, thus creating a situation of each committee having a partial view of the interests involved. For example, Members whose constituents rely on defence industries "for sustenance often seek seats on Armed Services or Appropriations Committees, hoping to influence which regions will get Pentagon contracts".[147] Or Members who emphasise diplomacy would favour Foreign Affairs/ Relations Committees. The point is that committees are "now the rule ... but decision making became immensely more difficult, because no faction, official or informal, can deliver consistently".[148] Moreover, what must be taken into account concerning the varied interests of Members of Congressional Committees, is the tremendous increase in employees staffing them. "During the period from 1955 to 1979, the number increased from just over 5,000 to about 20,000, raising the cost of maintaining the committee staffs from $170 million to $1.2 billion in 1980."[149]

Aside from the committee system, Congress' role in defence planning is further fragmented for two reasons. First, it is a bicameral House and, second, because of the interests of the Congressmen themselves. Regarding the former, there is the fact that bills must pass through both Houses. In many cases, the two versions of a bill differ, however this is usually resolved in a Conference Committee.[150] From the perspective of the lobbyist (whether lobbying for contractors or armed services), "the mere fact that bills must pass both the House and the Senate affords lobbyists two cracks at determining their fate".[151]

Regarding the interests of the Congressmen themselves - Congress contains 100 Senators, each of whom tries to satisfy federal, state, and political party interests. The House of Representatives with 435 Congressmen also has a fourth interest - district. Members of the House have a two year term and are perennially concerned with re-election compared to a Senator's six year term. Thus, Congress is a large body of policymakers whose political survival is a function of 535 different constituencies to whom all of the House of Representatives and one-third of the Senate are accountable every two years. "Congress, in this view, is the epitome of the weakness of the American system".[152]

Congress' lack of technical competence is reflected by the fact that "[a] almost every Congressman feels that he is an expert on education, or economics, or in any number of domestic fields. But when he deals with defense and foreign policy, he lacks confidence and tends to depend upon the 'experts' ... in uniform ... uniforms are identified with expertise".[153] Congress relies heavily on experts and scientists who may find themselves "on the political firing line, placed there by a politician interested in using the scientists prestige as an 'expert' to disarm the critics of his [the politician's] choices".[154]

As the following Chapters will demonstrate, defence planning and the military programmes involved have to be weighed against each other, and the conflicting interpretations of military requirements, the domestic needs and non-military foreign policy programmes, as well as the tax revenues and the demands of fiscal policy. "No Congressional Committee is competent to do this, not because it lacks the technical knowledge, but because it lacks the legal authority and political capability to bring together all these conflicting interests, balance off one against another, and arrive at some sort of compromise or decision".[155]

Thus far the main actors and organisations of defence planning have been outlined, and more discussion of these will follow before detailing the case history of the F-16. It is safe to assume that those at the top, for example the Joint Chiefs of Staff, the Secretaries of Defense and State, are managers exhibiting political skills. Further down the scale are found the professionals - the expertise or corporate mind of the organisation, usually exhibiting a longer tenure period. Expertise not only plays an important role with respect to influencing Congress, it also acts as an influencing factor regarding the weapons acquisition process within the DoD itself. The defence establishment is relatively decentralised in the aspects of its management. The "hierarchical general staff concept of organisation relies heavily on the principle of subordination. Varying amounts of power are distributed throughout the system, and each subordinate reports to one superior".[156] However, even at the "lower levels there is a typical tendency for a superior officer to insist that junior officers responsible for operations must pass their 'requirements' upward for reconciliation with the sub-budget for which the superior officer is responsible".[157] Moreover, the "superior officer usually lacks the detailed knowledge with which to determine priorities at the operating level ...".[158]

There is the "myth that a junior officer ... does not give orders to a superior officer".[159] Authority is a very complex phenomenon. "Legal authority [the right to demand obedience] cannot be confused with influence or power [the ability to retain obedience]."[160] Thus, if a hierarchical superior wishes to control his subordinates, he must use more than his legal authority. Although, "the Secretary of Defense does have the tools to manage the Department",[161] subordinates can manipulate their superior. "As one proceeds towards the top of the hierarchy, a superior has time for only the most cursory review of his subordinates' decisions or his staff's judgments".[162] The number and complexity of "decisions that reach the top conspire to reduce the executive's ability to influence more than a very few aspects of the action of his subordinates".[163] "Tremendous volumes of technical staff work will be reduced to a single recommendation by the time a problem reaches an executive up the line".[164]

Because the "detailed knowledge and ingenuity available at the lower ends of management",[165] most "decisions are in fact made at lower echelons. More frequently than not an executive must rely on his confidence in the staff rather than any deep knowledge of the merits of their judgments".[166] Or as Simon, Smithburg and Thompson pointed out, ~~that~~ it is more realistic to speak of a "line of confidence" from the top to the bottom, than a "line of command".[167]

The aforementioned leads to a situation of the executive being "trapped by the size of his organisation".[168] The executive is reduced to endorsing the proposals of his subordinates or staff officers. "[he] has precious little control beyond indicating general approval".[169]

The organisations involved in weapons acquisition, and the functions thereof, require further examination in order to determine the validity of defence decision making emanating upwards, and, if so, at which stages, during the development of a weapon system, is this most apparent. The following two Chapters discuss the stages of development, and the roles of individuals as well as organisations, and their relationships and influences to the process. This involves detailing those participants in both the inside and outside of the process. The approach taken in Chapters 3 and 4 is to review the development of weapons systems along fiscal lines as well as the life of a weapon system. This will demonstrate a greater level of participation by the DoD Components, at crucial stages, and also provide an understanding of the shifting of the decisional centres. Chapters 3 and 4 are by no means a complete description of each and every process. Nevertheless, the Chapters provide the relevant insights which, aside from the complexity involved, substantiate, "that there is much to be gained from careful study of this type of organisation ... and the conditions necessary for its effective functioning."[170]

N O T E S

1. COLLINS, J, "US Defense Planning : A Critique", Westview Press, 1982, p.15.

2. PFEFFER, J, "Power in Organisations", Stanford University, Pittman Publishing, 1981, p.35.

3. *Ibid*, p.37.

4. Former National Security Adviser, Frank Carlucci III (1986-87) and presently Secretary of Defense (1987-) is an example of this. Consider his professional history :

   Jantzen Co in Portland, Ore., 1955-56; Foreign Service Officer, State Department, 1956; Vice Consul, Economic Officer in Johannesburg, 1957-59; Second Secretary Political Officer in Kinshasa, Congo, 1960-62; Officer in Charge of Congolese Political Affairs, 1962-64; Consul General in Zanzibar, 1964-65; Political Affairs Counselor in Rio de Janeiro, 1965-69; Assistant Director for Operations, Office of Economic Opportunity, 1969, and Director, 1970; Associate Director, Office of Management and Budget, 1971, and Deputy Director, 1972; Under Secretary of Health Education and Welfare, 1972-74; Ambassador to Portugal, 1975-78; Deputy Director, Central Intelligence Agency, 1978-81; Deputy Secretary, Defense Department, 1981-82; Sears World Trade Inc., 1983-86.

   Source: The Washington Post, 3 December 1986, p.A29.

5. "America Rules, OK?", The Economist, Vol.255, No.6876, 7 June 1975, p.54. The article also states that "President Giscard D'Estaing (France) made the decision to turn down Dassault's Mirage F-1E ...".

6. "Air Force Selects YF-16 As Air Combat Fighter", News Release, Office of the Assistant Secretary of Defense (Public Affairs), 13 January 1975.

7. They were called Special Assistants until 1969.

8. NACHT, M, "Toward an American Conception of Regional Security", Daedalus, Winter 1981, p.17.

9. Section 402, Title 50, United States Code.

10. CUTLER, R., "The Development of the National Security Council", Foreign Affairs, Vol 34, No 3, 1956.

11. Air Force Lieutenant General Brent Scowcroft was Deputy Assistant to the NSC for 3 years. Kissinger had served concurrently as Secretary of State and Assistant to the NSC for 26 months, from September 1973 to November 1975. In response to political pressures, Kissinger passed the NSC post to his Deputy, Scowcroft. Scowcroft retired from active service at that point and turned in his "blue suit".

12. CUTLER, R., "The Development of the National Security Council", op.cit., p.441.

13. Idem.

14. Idem.

15. ENDICOTT, J., "The National Security Council", American Defense Policy, 5th Edition, Johns Hopkins Press, 1982 p.525.

16. DESTLER, I.M., "National Security Advice to US Presidents : Some Lessons from Thirty Years", World Politics, January 1977, p.156.

17. DESTLER, I.M., "National Security Management ; What Presidents have Wrought", Political Science Quarterly, Winter 1980-81, p.576.

    Further, the number of staffers also changed. For example, following Kennedy, where the institutional development of the NSC atrophied, Lyndon Johnson abandoned what was left preferring to do business on a personal basis instead of bureaucratically. Cabinet staffs, operations-orientated committees, cronies, catch-as-catch-can advisers and attendees at Tuesday luncheons reduced NSC authority and responsibility dramatically during eight consecutive years in the 1960s. FALK, S., BAUER, T., "The National Security Structure", Industrial College of the Armed Forces, Washington DC, 1972 pp.34-37.

18. Quotation from NIXON, Richard M., "US Foreign Policy for the 1970s : A New Strategy for Peace", Washington DC, US Govt. Print Off., 18 February 1970 p.17.

    The formal apparatus Nixon produced proved effective, but failed well before his first term ended. Dr Kissinger, his Assistant for National Security Affairs (and also Secretary of State starting in September 1973) developed such "hypercentralised" control over the staff and interagency groups that he became the President's main adviser on most critical issues. Together, Nixon and he tended to disregard or discount opposing views, and "made their own decisions based on their own analyses and kept key officials in the dark". DESTLER, I.M., "National Security Advice to US Presidents : Some Lessons from Thirty Years", World Politics, January 1977 p.154.

19. MARTIN, L., "The Management of Defense", St Martins Press, New York, 1976 p.23.

20. HALPERIN, M., "The President and the Military ", Foreign Affairs, January 1972 p.324.

21. MARTIN, L., "The Management of Defense", op.cit., p.24.

22. RANGE, P., US News and World Report, 24 November 1986.

23. The "revolutionary experiment" puts an experienced adjudicator into a job for which he has little professional preparation. GETLER, M., "Clark Curbs Administration Turf Struggles", Washington Post, 17 May 1982, p.A1,A9.

24. "Reagan's Front Man in the Shadows", The London Times - Profile, 17 April 1986 p.10.

25. Idem.

26. A further note: Only 4 of the Advisers had University degrees directly related to national defence - Kissinger (1969-75), Scowcroft (1975-77) and Brzezinski (1977-80) possessed Doctorates in Political Science, Allen (1981-82) an MA. Retention time measured about one year for Anderson (1955-56), Scowcroft (1975-77) and Allen. William Jackson (1956), in acting capacity, stayed in office for only four months. Although educational experience and retention time are low, half of them had had civilian employment that was pertinent: Bundy (1961-66), Kissinger and Brzezinski were Political Science Professors. Their published appraisals as well as

Walt Rostow's (1966-69) attracted attention to foreign policy and national defence. Allen had been a senior staff member at two "think tanks" in the 1960s. High level staff assignments with US Armed Services increased the competence of three others - Scowcroft had extensive political military planning experience; Anderson had once served as an NSC consultant; Allen had briefly been an NSC staffer in 1969, as deputy to Kissinger.

27. OLIVER, J., and NATHAN, J., "The American Environment for Security Planning", an essay as printed in, KRONENBERG, P., "Planning US Security", Pergammon Press, New York, 1982 p.42.

28. Idem.

29. Idem.

30. See, NIXON, Richard M., "US Foreign Policy for the 1970s : A New Strategy for Peace", Washington DC, US Govt. Print Off., 18 February 1970, which emphasises his initial desire to stress planning. Carter hoped to add a "think tank" to the NSC apparatus, according to GWERTZMAN, B., "Brzezinski Revises Staff and Systems at Security Agency", New York Times, 16 January 1977, pp.1,10.

31. DESTLER, I.M., "Can One Man Do?", was written in 1971, about the time Kissinger became deeply involved in "Lone Ranger" diplomacy. He later wrote about Brzezinski's bureaucratic infighting which interfered with effective planning. See, "A Job that Doesn't Work", Foreign Policy, Spring 1980, pp.80-88.

32. Most participants in the US National Security process deplore competition between the President's NSC Assistant and the Secretary of State or the Secretary of Defense. See, "Anonymity for National Security Adviser", National Journal, 17 May 1980 p.817.

33. Interview of William Hyland, Deputy Director of the NSC, Nightline News Show, as broadcast on NBC Television Network, 10 November 1986.

34. NACHT, M., "Toward an American Conception of Regional Security", op.cit., p.17.

35. See, US Congress, Senate, "The National Security Adviser : Role and Accountability, Hearings Before the Committee on Foreign Relations", 96 Cong., 2nd Sess., Washington DC, US Govt. Print Off., 1980.

36. The United States Government Manual 1981-82 prepared by the Office of the Federal Register, National Archives and Records Service, General Services Administration, Washington DC, US Govt. Print Off., 1 May 1981, p.391.

37. The total of State Department employees in 1984 was 23,650 (14,000 Americans and 9,650 Foreign Service nationals hired in their own country). See, "The Department of State Today", United States Department of State. Bureau of Public Affairs, US Govt. Print Off., May 1984, p.2.

38. Other agencies are the Agency for International Development (1961) and the United States Information Agency (1953).

39. Department of Defense Budget, Annual Report to Congress, Caspar Weinberger, Secretary of Defense p.IV-7.

    Department of State Budget, "The Department of State Today", Bureau of Public Affairs, US Govt. Print Off., May 1984, p.7.

40. Authors such as HALPERIN, "National Security Policy Making"; JACKSON & ZIMMERMAN, "The Shaping of Foreign Policy"; JONES, "Analysing Foreign Policy", et al, view weapons as a tool of foreign policy versus the State Department being a part of their development. But these authors neglect the role of the State Department in the future sales of a given weapon system, under development, and the arguments issued from the State Department, during the foreign sale of a weapon that the more units sold, decreases the unit cost to the US, has a very strong impact on that weapon's development. This, contractors and lobbyists know only too well.

41. Report to the Secretary of Defense on the National Military Command Structure; Report requested by the President, Washington DC, 1978.

42. The current Secretary of State (1982-), Mr Schultz, holds a PhD in Industrial Economics.

43. Alexander Haig matriculated in military science at both the Army War College and Navy War College.

44. For a listing of the Secretaries of State since World War II, see, p.68.

45. US Congress, Senate, "The Senate Role in Foreign Affairs Appointments", prepared for the Committee on Foreign Relations, 97th Cong., 2nd Sess., Washington DC, US Govt. Print Off., June 1982.

46. Public Law 96-465 (HR 6700) 94 Stat 2071, Section 504, "Foreign Service Act of 1980", 17 October 1980.

47. "The Department of State Today", United States Department of State, Bureau of Public Affairs, US Govt., Print Off., May 1984.

Americans employed by the State Department (14,000) are members either of the Civil Service (4,760) or the Foreign Service (9,240). Those in the Civil Service do not generally serve abroad.

48. Ibid., p.2.

49. It should be noted that another indicator of the prestige of the Secretary of State is that he ranks fourth in presidential succession, after the Vice-President, the Speaker of the House, and the President pro tempore of the Senate.

50. Under Secretaries for :

1) Political Affairs
2) Economic Affairs
3) Security Assistance
4) Science and Technology
5) Management

51. The Department of State also speaks for the US in the United Nations and more than 50 major organisations; maintains diplomatic and consular relations with more than 150 foreign governments; represents the US at about 800 international conferences annually. See, "The State Department Today", op.cit., p.21.

52. ROBINSON, W., "Programs for Improved Politico-Military Capabilities in the Department of State", Center for International Affairs, Harvard University, May 1965, p.43.

53. For a discussion on the influences of weapons contractors, lobbyists, outside institutes and academia, See, pp.172-73.

54. Section 133(a), Title 10, United States Code.

55. Public Law 81-788, 18 September 1950, said "this Act is not to be construed as approval by the Congress of continuing appointments of military men to the office of Secretary of Defense in the future. It is hereby expressed as the sense of the Congress that after General Marshall leaves the office ... no additional appointments of military men shall be made."

56. Section 134(a), Title 10, United States Code.

57. Interview with a respected source in the International Acquisition Office of The Pentagon, who wishes not to be identified.

58. Ibid.

59. For a listing of the SECDEFs, See, p.66.

60. Deputy SECDEFs are listed in Facts, Washington DC, Department of Defense 1978, updated 1982.

61. GS - Government Service - delineates the pay scale and stature of a government employee, eg, below the Senior Executive Section of DoD are the civil servants in grades, GS-13 to GS-15; below them are clerical GS-9 to GS-12, etc.

62. For example, many spaces were unfilled for months after President Reagan took office. Facts, 1978 Washington DC, Department of Defense, pp.7-10, updated 1982.

63. Fourteen OSD slots require Senate confirmation - the SECDEF; his Deputy; Under Secretaries for Policy and R & E; Assistant Secretaries for International Security Affairs, International Security Policy, Comptroller, Health Affairs, Legislative Affairs, Manpower, Reserve Affairs and Logistics, and Public Affairs; the Deputy Assistant Secretary for Reserve Affairs; Assistant to the Secretary (Atomic Energy); and the General Counsel. Facts, 1978, Washington DC, Department of Defense, updated 1982.

64. "The Secretary of Defense shall take appropriate action (including the transfer, reassignment, consolidation, or abolition of any function, duty, or power), to provide more effective, efficient ... operation", unless the House or Senate Armed Services Committee believes such steps would impinge on Service prerogatives or, "in its judgment, tend to impair the defense of the United States". The entire House of Senate must then adopt a prohibitory resolution before that view prevails. Section 125, Title 10, United States Code.

65. Facts, 1978, Washington DC, Department of Defense, updated 1982.

66. DoD Directive 1315.13, "Assignment of Military Personnel to Office of Secretary of Defense, Organisation of the Joint Chiefs of Staff, and Defense Agencies", 4 February 1970.

67. OSD lists 250 members of the Senior Executive Service and 850 civil servants in grades GS-13 to GS-15, Appendix, Budget of the United States, Fiscal Year 1983, Part II Schedules of Permanent Positions, Washington DC, US Govt. Print Off., 1982 p.II-24.

68. HUNTINGTON, S.P., "Soldier and State", Cambridge, Belknap Press of Harvard University Press, 1957, pp.452-53.

69. RAYMOND, J., "Power in the Pentagon", Heinemann, London 1964, p.277.

70. HAMMOND, P.Y., "Organising for Defense, The American Military Establishment in the Twentieth Century", Princeton University Press, 1961, p.4.

71. JANIS, I.L., "Victims of Groupthink", Houghton Mifflin & Co, Boston, 1972, p.37.

72. For example, Clark Clifford has his own firm in Washington, known as Clifford & Warnke; Elliot Richardson is a resident partner of the Washington firm of Meyers, Marshall & Meyers.

73. For example, the firm the author was employed by, Seyfarth, Shaw, Fairweather and Geraldson, numbered "200 attorneys representing more than 2,500 clients, including newspapers claiming more than 40 percent of the nation's daily circulation and some 70 of the Fortune 500 corporations ... the management of the firm is the exclusive province of its partners ...". See, MARGOLICK, D., "To Big Too Fast", The American Lawyer, September 1981, pp.19-27.

74. Marshall is also interesting because he also served as the second Secretary of State following World War II (1947-49) and again was the only one to have served within 10 years after relief from active duty within the armed forces.

75. Some examples : Cutler is a founding partner of the Washington firm Wilmer, Cutler & Pickering; Rogers is also a founding partner of the Washington firm of Rogers & Wells; and Muskie is a resident partner of the Washington firm of Chadbourne, Parks, Whiteside & Wolff.

76. GENTRY, J., (Lt.Col. USAF), "Evolution of the F-16 Multinational Fighter", Industrial College of the Armed Forces, Washington DC, 1976, p.43.

77. Section 171, Title 10, United States Code.

78. "President Carter Signs Reorganisation Law Establishing Two Under Secretary Positions", News Release, Washington DC, Office of Assistant Secretary of Defense (Public Affairs), 21 October 1977.

79. Department of Defense, Annual Report, Fiscal Year 1981, Washington DC, Department of Defense, 29 January 1980.

80. POM and Budget submissions will be discussed in following Chapters. However, for now, a POM takes a service at least 6 months to construct based on the previous year's effort which identifies the objectives and needs of a Service for a given year and its 5 year plan, and is submitted to OSD for review.

81. Department of Defense Annual Report FY 1981, Washington DC, Department of Defense, 29 January 1980.

82. Memoranda prepared by the Deputy Secretary of Defense, Management of the DoD Planning, Programming and Budgeting System, 12 June 1981, p.4.

83. The Chairman of the DRB, whose primary post is the Deputy SECDEF, is "the man who runs the Pentagon". Management abilities take top priority during the selection process. The Director of PA & E plays two prominent roles in the DRB, related to "fiscal guidance" and "cost-effective force trade-offs, cross-Service balance and mutual support". Secondly, he assists in ensuring that programmes and policies are consistent. From Memoranda on Management of the DoD Planning, Programming and Budgeting System, 12 June 1981, p.5.

84. The Defense Resources Board (DRB) is chaired by the Deputy Secretary of Defense whose purpose is to assist the SECDEF in managing the planning programming and budgeting process. The DRB was established to supervise the Office of the Secretary of Defense (OSD) review of the Department of Defense Components' Program Objectives Memoranda (POMs) and Budget submissions. The DRB meets on a monthly basis and more, if necessary, to review proposed planning guidance; to manage the programme and budget review process; to advise the SECDEF on policy, planning and budget issues and proposed decisions; to perform programme evaluations and reviews of high priority programmes on a regular basis; and to assure that major acquisitions systems are more closely aligned to the PPBS.

    Source: Memorandum from Deputy Secretary of Defense re: "Defense Resources Board", Department of Defense, Washington DC, 27 March 1981.

85. Memoranda prepared by Deputy Secretary of Defense, Program Review Schedule, 7 May 1981.

86. Known as the 33 Improvement Program Initiatives or the Carlucci reforms, the Defense Resources Board became concerned with aspects of business such as multi-year procurement; increasing the programme stability to reduce costs and time; encourage capital investment to enhance productivity; economic production rates, assurance of appropriate contract type, to name a few. See, "Status of the Defense Acquisition Improvement Program's 33 Initiatives", GAO Report, Washington DC, September 1986.

87. Memoranda prepared by the Deputy Secretary of Defense, Management of the DoD Planning, Programming and Budgeting System, 12 June 1981, pp.4,6.

88. Memoranda for the Members of the Defense Resources Board from the DRB Executive Secretary, Subject: Program Review Procedures, 9 June 1981, attached to: Memoranda for the Deputy Secretary of Defense from Chairman, PPBS, Review Steering Group PPBS Review Report, p.5.

89. Interview with Mr Bert Cooper, Specialist in Aircraft Procurement, Foreign Affairs and National Defense Division, Congressional Research Service, November 1982 - April 1983.

90. Ibid. Also, for a discussion of Program Decision Memoranda, see, pp. 130-134.

91. "Defense Resources Board (DRB) Role and Membership", pp.3-4, as printed in, Memoranda for the Members of the Defense Resources Board from the DRB Executive Secretary, 9 June 1981.

92. ROHERTY, J.M., "Decisions of Robert S McNamara", Coral Gables, Florida, University of Miami Press, 1970, pp.72-73.

93. An example of chance - General Dynamics never would have thought that orders for F-16s would be cancelled by Iran at the downfall of the Shah of Iran and to be so lucky to have Israel quickly gain NSC approval to have the Shah's order delivered to them instead.

94. Section 141 (d)(1), Title 10, United States Code.

95. Ibid.

96. Report for the Chairman, Joint Chiefs of Staff, "The Organisation and Functions of the JCS", Washington DC, April 1982.

97. Report to the Secretary of Defense on the National Military Command Structure, Report requested by the President, Washington DC, 1978, p.7.

98. For example, and not to be confused with NATO, the US European Command (EUCOM), established in 1952, is a Unified Command with three component Services : US Army, Europe; US Naval Forces, Europe; and US Air Force, Europe. Moreover, a Unified Command usually does not cover only the land mass which its title designates. For example, the US European Command's (EUCOM) present area of responsibility covers all of Western Europe, including the United Kingdom and the Republic of Ireland the Mediterranean Sea and its littoral countries, and the Middle East land mass to the eastern border of Iran, the Persian Gulf and the Red Sea. A Specified Command, on the other hand, is one which has a broad continuing functional mission and is usually composed of forces from one Service, eg the Strategic Air Command or the Military Airlift Command.

99. The Unified Command Plan has its origin in the US command arrangements of World War II and its legal basis in the National Security Act of 1947, as amended. Although the Joint Chiefs of Staff are not in the chain of command, they do play a role in it. The National Security Act of 1947 authorises the President through the Secretary of Defense and with the advice of the Joint Chiefs of Staff who establish combatant commands.

100. Report to the Secretary of Defense on the National Military Command Structure, op.cit., pp.49-50.

101. For a discussion of the Planning, Programming, Budgeting System (PPBS), See pp. 110-113.

102. Section 143, Title 10, United States Code.

103. Section 142, Title 10, United States Code.

104. The OJCS presently includes 682 officers. See, Report for the Chairman, Joint Chiefs of Staff, "The Organisation and Functions of the JCS", Washington DC, April 1982, p.4.

105. Section 143, Title 10, United States Code.

106. STEADMAN, R.C., Report to the Secretary of Defense on the National Military Command Structure, Washington DC, Office of the Secretary of Defense, July 1978, pp.51,53, hereinafter referred to as "The Steadman Report".

107. Report to the Secretary of Defense on the National Military Command Structure. Requested by the President, July 1978, p.51.

108. Interview with a respected source in the International Acquisition Office in The Pentagon who wishes not to be identified.

109. Report to the Secretary of Defense on the National Military Command Stucture, op. cit., p.51.

110. JONES, D.C., "Why the Joint Chiefs of Staff Must Change", Washington DC, Office of the Chairman of the Joint Chiefs of Staff, February 1982, pp.13-14.

111. Report to the Chairman, Joint Chiefs of Staff, The Organisation and Functions of the JCS. Washington DC, April 1982, p.7.

112. Steadman Report, op.cit., pp.65-69.

113. JONES, D.C., "Why the Joint Chiefs of Staff Must Change", op.cit., p.11.

114. Report to the Secretary of Defense on the National Military Command Structure, op. cit., p.52.

115. Steadman Report, op.cit., pp.49-51.

116. Section 142, Title 10, United States Code.

117. Blue Ribbon Defense Panel Report, Staff Report to the Joint Chiefs of Staff, Decision-making to the Report to the President and the Secretary of Defense on the Department of Defense by the Blue Ribbon Defense Panel, Washington DC, July 1970, p.7.

118. *See*, pp.265-66 where in the case of the F-16, Congress issued funds for both the Navy and Air Force to develop a Light Weight Fighter, in FY 1972 Appropriations. The Air Force, in particular, did not want the Navy to be involved in its decision.

119. Report to the Chairman, JCS, "*The Organisation and Functions of the JCS*", *op.cit.*, p.10.

120. JONES, D.C., "*Why the Joint Chiefs of Staff Must Change*", *op.cit.*, p.13.

121. The Steadman Report, *op.cit.*, p.55.

122. Report to the Chairman, JCS, "*The Organisation and Functions of the JCS*", *op.cit.*, pp.8, 47-48.

123. *Ibid*, p.48.

124. Interview with Mr David Wilson, Legislative Assistant, Senate Committee on Armed Forces, US Congress, February 1983, Washington DC.

125. Report to the Secretary of Defense on the National Military Command Structure, *op.cit.*, p.55.

126. Interview with a respected source in the International Acquisition Office in the Pentagon, who wishes not to be identified.

127. PETERS, G., "*Bureaucracy, Politics and Public Policy*", Comparative Politics, Vol. 11, No.3, April 1979, p.353.

128. Blue Ribbon Defense Panel Report, *op.cit.*, Annex N, p.6.

129. The Secretary of Defense has "authority, direction and control over the Department of Defense ... The Joint Chiefs of Staff are [his] principal military advisers". Section 133(a) and 141(b), Title 10, United States Code.

130. The Steadman Report, *op.cit.*, p.58.

131. Blue Ribbon Defense Panel Report, *op.cit.*, p.8.

132. TWINING, General N.B., Chairman of JCS (1957-60) discussed Secretaries of Defense who "did not intrude [their] own judgments into military matters on which there was a unified and harmonious [JCS] position" and he deplored McNamara's presumption "to have the last word - even when the uniformed professional establishment is unanimously opposed." See, TWINING, N., "Neither Liberty, Nor Safety : A Hard Look at US Military Policy and Strategy", Holt, Rinehart & Winston, New York, 1966, p.133.

133. LONG, F., and REPPY, J., "The Genesis of New Weapons, Decision Making for Military R & D", Pergammon Press, New York, 1980, p.165.

134. Ibid, p.167.

135. Section 141(d)(1), Title 10, United States Code; Blue Ribbon Defense Panel Report, op.cit., pp.7, 34.

136. MARTIN, L., "The Management of Defense", op.cit., p.25.

137. COLLINS, J., "US Defense Planning", op.cit., p.70.

138. "Strategy and Defense Intellectuals", Saturday Evening Post, 4 May 1963, p.10.

139. The Assistant Secretary of Defense for Program Analysis and Evaluation (PA & E) was downgraded to Director PA & E in May 1981. The present incumbent still reports directly to the Secretary of Defense, but lacks the clout enjoyed by his predecessors, even though the job description is essentially unchanged.

140. COLLINS, J., "US Defense Planning", op.cit., p.73.

141. The War Powers Act was passed by Congress to limit the Executive on the use of military forces. The 1973 War Powers Act, Public Law 93-148, limits "the President as Commander-in-Chief to introduce Armed Forces into hostilities except in the case of a declaration of war, a specific statutory authorisation or a national emergency created by an attack on the US, its territories or possessions or its armed forces". The President in every possible instance shall consult with Congress before introducing US Forces into hostilities.

142. KRONENBERG, P., "Planning US Security Defense Policy in the Eighties", Pergammon Press, New York, 1982, p.38.

143. Ibid, p.39.

144. BOBROW, D., "Components of Defense Policy", Princeton University Press, New Jersey, 1966, p.82,

145. Idem.

146. Idem.

147. COLLINS, J., "US Defense Planning", op.cit., p.71.

148. SINDLER, A., "America in the Seventies : Problems, Policies and Politics", Little Brown and Co., Boston, 1977, p.2-3.

149. CRABB, C., "American Foreign Policy in the Nuclear Age", Harper and Row, New York, 1983, pp.218-19.

150. A Conference Committee is composed of Members of both the Senate and of the House of Representatives whose purpose is to resolve differences between the two versions of one Bill. In Washington, it is also referred to as the Third House of Congress. Also, See, footnote 51 in Chapter 3.

151. DAVIDSON, R., and OLESZEK, W., "Congress and its Members", Washington DC, Congressional Quarterly Press 1981, p.348.

152. KRONENBERG, P., "Planning US Security", op.cit., p.36.

153. ASPIN, L., "The Defense Budget and Foreign Policy : The Role of Congress", Daedalus, Summer 1975, p.157.

154. BOBROW, D., "Components of Defense Policy", op.cit., pp.160-161.

155. Ibid, p.82.

156. RIES, J., "The Management of Defense, Organisation and Control of the US Armed Services", Johns Hopkins Press, Maryland, 1964, p.45.

157. ENKE, S, "Defense Management", Prentice-Hall Inc., New Jersey, 1967, p.352.

158. Idem.

159. RIES, J., "_Management of Defense_", _op_._cit_., p.45.

160. _Idem_.

161. KRONENBERG, P., "_Planning US Security_", _op_. _cit_., p.144.

162. RIES, J., "_Management of Defense_", _op_._cit_., p.46.

163. _Idem_.

164. SIMON, H., SMITHBURG, D., THOMPSON, V., "_Public Administration_", Knopf, New York, 1950, p.533.

165. ENKE, S., "_Defense Management_", _op_._cit_., p.338.

166. RIES, J., "_Management of Defense_", _op_._cit_., p.46.

167. SIMON, H., _et al_, "_Public Administration_", _op_._cit_., p.533.

168. RIES, J., "_Management of Defense_", _op_._cit_., p.46.

169. _Idem_.

170. ENKE, S., "_Defense Management_", _op_._cit_., p.338.

CHAPTER 3

THE FISCAL CYCLE AND THE DECISIONAL PROCESSES

The term "weapons acquisition" has been used throughout the text hitherto without any explanation as to what it is.

> "The weapons acquisition process of any country is a heterogeneous activity that varies considerably over many dimensions. The specific military service, the class of equipment, and the vagaries of time are but a few of the dimensions over which enormous disparities are observed. In order to reduce to a manageable size the problem associated with a description and analysis of weapons acquisition, some simplifications are necessary."[1]

Primary objectives can be acquired if the proper decision making and action is pursued by the group, individual or organisation seeking the objectives. Thus, it is important to appreciate the acquisition process from the perspective of the decision maker, who as an insider is directly influencing and checking the acquisition process hoping to achieve their primary objective as the end resultant. The process from the decision maker viewpoint breaks down into four phases along organisational structure lines :

1. Concept Exploration (Conception)
2. Demonstration and Validation (Research and Development)
3. Full-Scale Development
4. Production and Deployment.

It would appear that the decisions made by the various actors whilst considering a weapon system at each phase should suffice. However, from the outset there is a problem. Because, also operational and interacting with these four phases are two distinct cycles of decision making in weapons acquisition - the <u>Fiscal Cycle</u> and the <u>Life Cycle</u>. The Fiscal Cycle is the annual planning and budgeting for all weapon systems whether deployed (maintenance or increasing numbers of that system) or at the stage of Concept Exploration. The Life Cycle is the time it takes for a weapon system to go from Concept Exploration to Production and Deployment. Previous authors have usually pursued the acquisition of a system through these four phases and completely overlook the fact that the acquisition of weapons systems is in itself a combination of two parallel decision cycles. For example, when Paul Hammond[2] reconstructed the political arguments that occurred regarding the issue of the Super Carrier and the B-36 bomber through these steps, he neglected much of the first phase - Concept Exploration. Although he sought to answer questions regarding the relationship of the Navy to the Armed Services Committee, or the effect of Congress and the public debate sponsored by the House Armed Services Committee concerning the B-36, he failed to mention that these were more or less "Oversight" debates which concerned the system. Moreover, whilst he touched on Service rivalry, he neglected to ascertain how the political manoeuvring may have been affected within these two parallel decision cycles.

A better study was conducted by R.J. Art[3] in his investigation of the TFX aircraft (later designated the F-111) decisions. He illustrated the association between costs and the institutional processes and political pressures. However, he did not categorise the decisions in the two distinct files of the Fiscal Cycle and the Life Cycle. Similarly, two other authors of distinction in the field of weapons acquisition, namely, R.G.Head[4] and M.H. Halperin[5] also neglected to separate the two cycles and to view the dynamics between the two and the manoeuvring made possible by the institutional processes. For example, if R.G.Head had separated the decisions into the two categories, he may have demonstrated that Fiscal Cycle decisions emanating as organisational outputs are the inputs into Life Cycle decisions reflecting the Governmental (or Bureaucratic) Politics Model, and vice versa.

This Chapter and the following Chapter will deal exclusively with the two cycles, and more specifically to their dynamics, and the relationship between the two cycles at various phases of the decision process. This examination will reveal a clearer and more concise understanding of the basis of the acquisition process as well as the higher degree of activity and influence of the DoD Components. The criticism could be levied that a distinction between the two cycles is arbitrary. Rather, these two consecutive Chapters will evidence that a distinction between the two is necessary and valid. The distinction of the two cycles will be more readily accepted once the facts are established in regard to the complexity of their fusion. They are both highly compartmentalised and distinctly separate, and yet, they are very closely inter-related. In essence, earlier approaches to the decision making of weapons acquisition dealt more fully with the Life Cycle of a weapon system, and although their examination may have illustrated models on costs, uncertainties in costs, they neglected to treat those (costs), as a separate decisional entity, operating within the Fiscal Cycle instead of the Life Cycle. This interpretation is essentially a misunderstanding of the important details, because, in fact, any weapons system during the course of <u>each</u> year of its life, must pass through the machinery of the Fiscal Cycle. Every defence programme/acquisition is constantly involved in the two parallel decision cycles referred to as :

1) the Fiscal Cycle - the cycle by which any weapon system must pass through each year of its life;

2) the Life Cycle - the cycle by which any weapon system must pass through just once.

The Fiscal Cycle, which is the central focus of this Chapter, is the annual planning, programming, budgeting and enactment and apportionment activity. The Fiscal Cycle is made up of Chiefs of Staff Joint Strategic Planning System, the Department of Defense Planning, Programming, Budgeting System (PPBS), the Congressional Authorisation and Appropriation enactment phase. The final enactment of the bills, and the eventual apportionment of funds for the operating budgets for the DoD Components are ratified by means of the President's signature.

The Life Cycle is the time it takes a programme to go from basic research and conception through development, production, and deployment. It might appear that weapons acquisition, in general, follows the same mode as the Life Cycle. This, however, is not the case. In order to fully appreciate the complexity of the decision making efforts involved in weapons systems, it is helpful to treat the Life Cycle as an additional component of the acquisition process, which in turn, is effected by the continuing Fiscal Cycle, which vacillates between facilitating and hampering the progress of the weapons system.

An improved evaluation of the decision making in the acquisition of modern weaponry is helped by utilising the set of questions to test defence programming. Regardless of size, the defence programmes must be able to give an affirmative response to the three questions below :

1) Is it needed or wanted by the defence forces?
2) Is it technically feasible?
3) Is funding available to develop and deploy it?

Any of the stages of the Fiscal and Life Cycles which generates a "No" answer to one of these questions affects that programme's outcome. For instance, a programme has proper documentation to show that it is needed - a Life Cycle decision. The Research and Development (R & D) community states that it is technically feasible - another Life Cycle decision. The Department of Defense and the Developing Service plan funding for it - a Fiscal Cycle decision. But, should the Congress decide <u>not</u> to appropriate funds for it - a Fiscal Cycle decision - then, the programme is "dead".

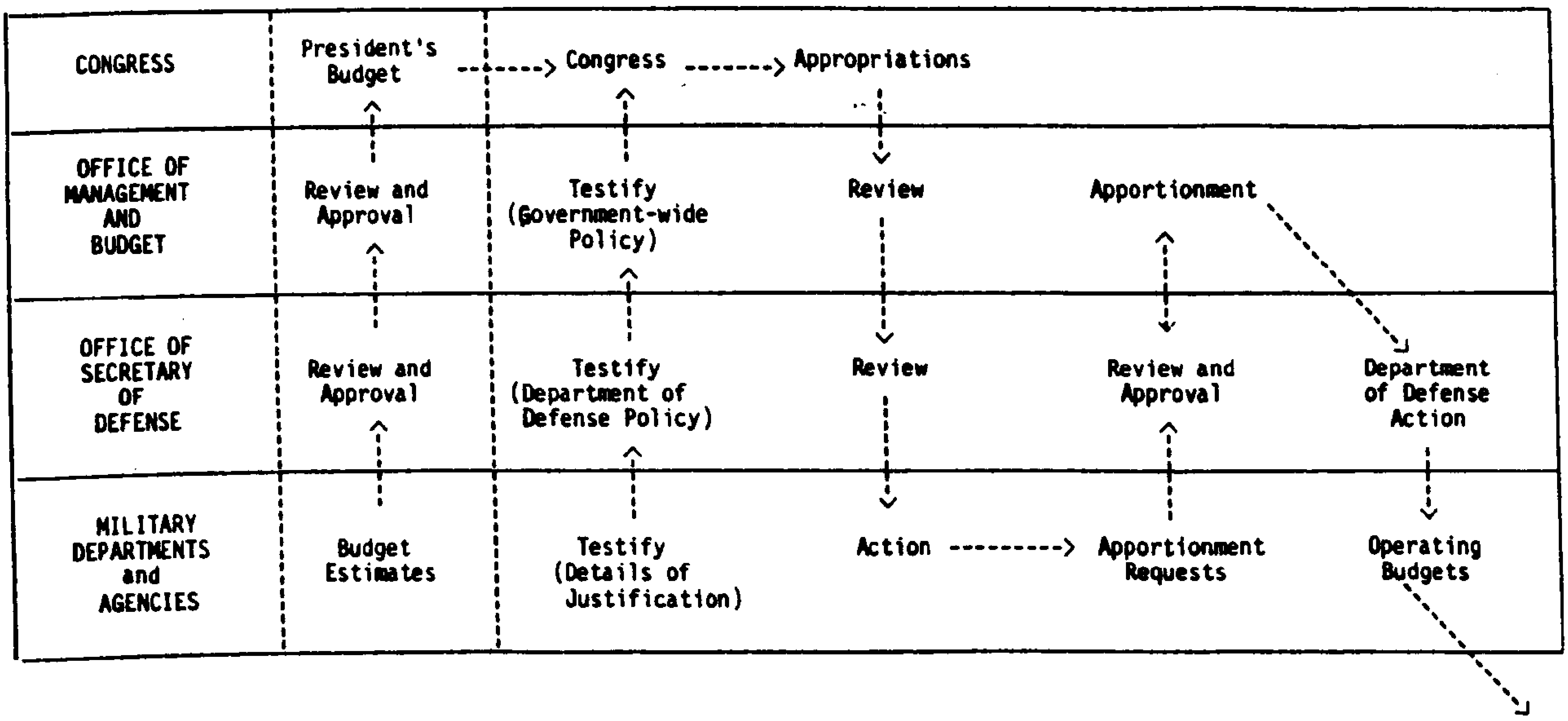
There is no reason to dispute the premise that the two cycles are interdependent, emphasising the fact that in a given instance, the Fiscal Cycle has implications for Life Cycle decisions - and vice versa. Moreover, a further complication is that quite possibly a "Yes" answer may be simultaneously generating a "No" answer for the same programme. The case of the F-16 bears witness to this, and equally important, demonstrates the dependent relationship of the two cycles on one another. For example, Congress appropriated general Research and Development funds to the Department of Defense (DoD) - a Fiscal Cycle decision. The US Air Force and DoD prepared documentation to show its needs for a new light weight fighter - a Life Cycle decision. Air Force received funds to prototype the YF-16 (General Dynamics) and YF-17 (Northrop) aircraft - a Fiscal Cycle decision. The Air Force selected the F-16 - a Life Cycle decision which generated a "Yes" for General Dynamics and a "No" for Northrop Corporation. Although a "Yes" was determined for the overall F-16 programme, the "No" sent to Northrop affected the outcome of the F-16 programme, in that the Navy opted for Northrop (F/A-18) which, consequently, ended in Congressional pressure for commonality.

The Fiscal Cycle

The Fiscal Cycle consists of the Executive and Legislative actions necessary to provide a yearly operating budget to the Department of Defense (DoD), as shown in the figure below.

Figure 3-I

Preparation of DoD's Operating Budgets



At the outset, it should be emphasised that the Fiscal Cycle is not a one-way discourse. It is an exercise of advocacy - first, within the military departments and agencies, for example, between the Joint Chiefs of Staff (JCS) and the Unified and Specified Commands; next, between the Department of Defense (DoD) Components and the Joint Chiefs of Staff (JCS) as a corporate body; then, between the military establishment and the National Command Authority; and, finally, between the Executive and Legislative branches of the government.

The total time span of one Fiscal Cycle takes a little more than two years. The "in-house" Department of Defense (DoD) effort takes 17 months alone - August of one year through December of the following year. The results of that effort are then fed into the overall National Budget and presented to the Congress by the President, usually in January. The review and enactment of the Authorisation and Appropriation Bills take from January to September (sometimes October) so that DoD has its operating budget about 26 months after it had begun working on it.

These 26 months of the Fiscal Cycle are taken up by four distinct phases :

1) Planning
2) Programming
3) Budgeting
4) Enactment

All phases are inter-related and each is dependent on the other, as well as being inter-related and dependent on the other four stages of weapons acquisition.

To get to the point where the Secretary of Defense can submit his annual budget to the President, the defence establishment uses two systems covered by separate instructions. The first is the Joint Strategic Planning System. The second is the Planning, Programming and Budgeting System (PPBS).[6]

The importance for reviewing these two systems of the Fiscal Cycle is to demonstrate that "the decisions having the largest effect on the outcome may well be those that are made ... in the planning and programming process".[7] This opinion will be pursued further in the discussion to follow. This proposal is founded on the evidence that the DoD Component, at certain stages and phases of the conception and development of a weapon system's life enjoys an influencing position in the decision making. The case history of the F-16 will document and validate this datum. However, before reviewing the Planning, Programming and Budgeting System (PPBS), attention will now be directed to the other system of the Fiscal Cycle.

Joint Strategic Planning System (JSPS)

The Joint Chiefs of Staff (JCS) are charged with certain strategic responsibilities and to discharge these responsibilities the Joint Chiefs of Staff have developed what is known as the Joint Strategic Planning System (JSPS).[8] To carry out the functions of the Joint Strategic Planning System, the Joint Chiefs of Staff promulgate seven documents, as follows :

1) Joint Intelligence Estimate for Planning, containing estimative intelligence for the short and mid-range periods. It describes situations and developments throughout the world that could affect US security interests.[9]

2) Intelligence Priorities for Strategic Planning, which establishes comprehensive military intelligence subjects, targets and priorities for the short and mid-range periods.[10]

3) Joint Security Assistance Memorandum, which provides military views on alternative funding levels projected for the US-financed Security Assistance Program, security assistance manning levels and key arms transfer policy matters.[11]

4) Joint Strategic Capabilities Plan, whose purpose is to provide guidance to the Commanders of the Unified and Specified Commands and the Service Chiefs for the accomplishment of military tasks, based on projected military capabilities and conditions.[12]

5) Joint Long-Range Strategic Appraisal provides consolidated estimative intelligence, strategic forecasts and broad force structure implications.[13]

6) Joint Strategic Planning Document[14] is one of the two most important documents of the Joint Strategic Planning Systems because of the integral role it plays in the actual Planning, Programming and Budgeting System (PPBS)[15] where it is submitted for use in the development of the draft Defense Guidance, (DG).[16]

7) Joint Program Assessment Memorandum [17] is the other most important document in the Planning, Programming and Budgeting System (PPBS) because it is submitted for consideration in reviewing the Services Program Objective Memoranda (POMs)[18] developing Issue Papers and drafting Program Decision Memoranda (PDMs).[19]

Prior to directing attention to the second system, the Planning, Programming and Budgeting System of the Fiscal Cycle, it is necessary to make three comments. First, these seven documents, especially the latter two, are of some importance in the consideration of any weapon system. Second, because there are seven documents, the Joint Chiefs of Staff, aspiring to opinions and themes that are consistent and harmonious, though these are good intentions, are often interrupted by the necessity to deal in generalities (as previously mentioned). Finally, the preparation of these documents substantiates another point made in the previous Chapter. It is required that the JCS staff draft these reports, but the underlying point is that the staff rely on the Service's expertise in drafting these documents. It seems probably then, that a certain Service's "wish list" may well be entered into these documents.

Planning, Programming, Budgeting System (PPBS)

The second system, covered by its own separate instructions from that of the Joint Strategic Planning System (JSPS), which the defence establishment utilises to get to the point that the Secretary of Defense (SECDEF) can submit his annual budget to the President, is the Planning, Programming and Budgeting System (PPBS). The Planning, Programming and Budgeting System (PPBS) "is the only one (of the two systems) which ties all facets of the defense effort together, relating national security objectives to strategy, strategy to forces, forces to resources, and resources to costs ...".[20] Within the process, is the development of mid-range objectives, the conduct of special studies and the research and development of weapon systems and their support. In fact, all resources of the Services are drawn upon to formulate their plans, programmes and budgets. It is imperative from the outset that the major actor(s) who initiate or make the decisions within the Planning, Programming and Budgeting System (PPBS) be identified, prior to setting out a seemingly simple outline of this very complex decisional process.

Conventional wisdom derived from legal statute dictates that decisions pertaining to the planning, programming and budgeting process are made by the Secretary of Defense (SECDEF).[21] As mentioned earlier, Congress gave the SECDEF, under the policy guidance and the direction of the President and the National Security Council, two distinct lines of authority. A direct line of command was established through the Joint Chiefs of Staff (JCS) to the Unified and Specified Commands, although the Joint Chiefs of Staff are not in the chain of command. A line for administrative control of the military departments and for management of support of military forces was established through the Secretaries of the Military Departments. Via the command line of authority, the SECDEF issues decisions regarding threat appraisal, strategy and force structure. The administrative line of authority enables him to issue decisions regarding programming of resources to support the force structure and the budgeting of annual funds to support various programmes. Prior to detailing the complexities of the Planning, Programming and Budgeting System (PPBS), it is necessary to note that throughout the process, because of the sheer complexity and workload of the systems, many decisions are already agreed upon before the involvement of the Secretary of Defense (SECDEF). The Secretary of Defense should be seen as a manager, or essentially as the Chairman of the Board. The workload of managing the entire Department of Defense rests on the Secretary of Defense, and his office. Consideration of his weighty responsibilities indicates that to carry out much of his work and decision making, he must depend on the expertise of subordinates who keep him briefed of the complexities of a system, as well as the technological data, the systems' needs, cost effectiveness, matching resources and other related details of the system. There is also the added dimension that the SECDEF lacks previous expertise in defence planning before becoming the SECDEF. Thus, he is in a position of delicate balance: he must learn, and most likely he would have to be educated by his subordinates. This problematic situation often times leaves the leader no other alternative but to accept knowledge and direction from his staff. If the relationship proves to be a compatible one, the Secretary's trust in his staff increases, and he is more often than not inclined to take their advice when difficulties arise. Likewise, the lower echelons are occasionally able to have their ideas viewed and accepted by higher echelons by utlising their superiors to act as a mouthpiece for their own interests. However, there is a check on this procedure. The staff could never expect the majority of their objectives to be realised in this manner. The SECDEF is a political actor, and his own actions will be complicated and interrupted by the other variables and influences that are directed towards him. For example, the influences of power could occur from within the DoD, or they could just as easily be perpetrated from without - the President, Secretary of State, Congress, <u>et al</u>. Therefore the SECDEF must always appear to be in full control of the decisional processes, and be prepared to take responsibility for those decisions. However, the importance of this point in the examination of the Planning, Programming, and Budgeting System (PPBS) lies in the fact that subordinates outside the Office of the Secretary of Defense also make decisions which are the responsibility of the SECDEF.

To summarise, it was previously stated that the Fiscal Cycle, as opposed to the Life Cycle, is comprised of four distinct phases : Planning, Programming, Budgeting and Enactment, taking a total time of 26 months to complete. As mentioned, all phases are inter-related and dependent on one another. Enactment will be treated as a separate entity so as to clarify the processes. By temporarily eliminating the Enactment Phase and looking only at the Planning, Programming and Budgeting System (PPBS) the total Fiscal Cycle time is reduced to a 17 month time cycle. In order that the stages of the PPBS can be better absorbed, the timing of the PPBS is set for the preparation of the Fiscal Year (FY) 1975 Budget.[22] Congress provided $32 million in the FY 1975 Budget for the Air Force's Air Combat Fighter.[23] Thus, the entire cycle began in August 1972 (26 months for total cycle, August 1972 - October 1974). However, the Planning, Programming and Budgeting System (PPBS) was completed by December 1973 or early January 1974. The PPBS can further be broken into three phases with the time periods being :

Planning Phase - August 1972 - January 1973
Programming Phase - January 1973 - August 1973
Budgeting Phase - August 1973 - January 1974

This is followed by Enactment which would be completed usually by late Autumn of 1974.

I. Planning Phase (August 1972 to January 1973)

I-1 August 1972 - The Commanders of the Unified and Specified Commands (CINCs) prepare their personal recommendations for major changes in the previous Defense Guidance (DG). These Commanders have been receiving year round reports from their Component Commander for each assigned Service element. These Component Commanders report on operational matters directly to the Unified and Specified Commanders (CINCs), but on matters concerned with personnel or material support, they report to their Military Department. The chain of command runs from President to the Secretary of Defense to the Unified and Specified Commanders, who exercise operational command over the forces assigned to them. As with the chain of command, these Commanders' inputs into the Defense Guidance (DG) emphasise threat appraisal, strategy, operational problems, et al. The Defense Guidance (DG) is prepared by the Under Secretary of Defense for Policy whose purpose is to provide the Secretary of Defense (SECDEF) with guidance to the DoD Components for the preparation of their Program Objectives Memorandum (POM).[24]

I-2 Late August 1972 - The Commanders of the Unified and Specified Commands' (CINCs') recommendations are furnished to the SECDEF. After submission, the Joint Chiefs of Staff (JCS) and the CINCs meet with the Defense Resources Board to review and assess their recommendations.[25] These meetings are crucial in the respect that here the means are to meet the requirements. Those in the chain of command (CINCs) who are concerned with the operational matters meet with those, the Joint Chiefs of Staff, who are not in the chain of command, but who are concerned with the personnel and material to meet the operational concerns. Many trade-offs and balances must be struck in view that they are meeting before the Defense Resources Board whose Chairman is the Deputy Secretary of Defense. Although the recommendations had been submitted to the SECDEF before these meetings, his lack of presence at these meetings is further proof that he only has time to be briefed later of their outcome. However, it must not be discounted that the SECDEF is also busy managing the rest of the DoD's activities as well as its political image.

I-3 Late August/Early September 1972 - Various other organisations provide other key inputs into the planning process to the SECDEF. These include from the Office of the Joint Chiefs of Staff the Joint Strategic Planning Document, one of the most important documents of the Joint Strategic Planning System (discussed above). Also major issues which the DoD Components wish to have considered during the development of the Defense Guidance, are incorporated, as are other references pertinent to the development of the policy, strategy and force planning sections of the Defense Guidance.

I-4 September 1972 - Based on the Defense Resources Board's (DRB's) assessment of the CINCs' recommendations, the Office of the Under Secretary of Defense, Policy, develops in co-ordination with the staffs of the DoD Components and the Office of the Joint Chiefs of Staff and the Office of the Secretary of Defense, a "FOR COMMENT" draft of the Policy Guidance section of the Threat Assessment, Policy, Strategy and Force Planning part of the Defense Guidance. It has been claimed that the Joint Chiefs of Staff play little if any role at all, simply because they are not in the chain of command, and, therefore not as much concerned with operational matters as much as managing the personnel and material of their Military Service.[26] However, more significant, as mentioned earlier, the Office of the Joint Chiefs of Staff lacks the staff to work on such documents, thereby having to rely on DoD Components or the Services to do so. Being that the DoD Components are involved at this stage it would be redundant for the Joint Chiefs to be involved on their own. The JCS would have already received inputs from the DoD Components before ever previously meeting with the CINCs (see I-2), and afterwards recommended any changes to the DoD Components which at this stage would be reviewed by the JCS to make sure that they are implemented. Essentially, the issue is whether or not the JCS played any role whatsoever save being a rubber stamping group in the interest to appear harmonious. "Rewriting and recycling is the rule ... The Joint Chiefs themselves become 'wordsmiths' ...".[27] If little or no role was played by the JCS aside from meeting with the CINCs, it is further proof that decisions emanate from below.

<u>I-5</u> Early October 1972 - The Office of the Under Secretary of Defense, Policy, provides the FOR COMMENT draft Policy Guidance section of the Defense Guidance to the DoD Components, the CINCs, the staff of the National Security Council (NSC), the Department of State and the Office of Management and Budget (OMB) for review and comment. Two other organisations are involved at this stage, namely, the National Security Council with its focus of the national state of security, and the more far reaching Department of State, focused on the international threats, strategies, and the international repercussions of all the above groups' decisions. Also, a third organisation, the Office of Management and Budget (OMB) is supposed to act as a sieve trying to match the required needs with a limited resource - money. In essence, the OMB does not deal with specifics at this stage. It merely assigns an amount for overall defence spending in a given year with future projections. The actual fighting of amounts for any one system versus another takes place later in OMB and in other corridors. This is where the OMB informs the DoD Components as well as the SECDEF, Department of State, the NSC, <u>et al</u>, on the amount of monies available, the portion of which one receives is resolved in later phases. Consider the consequences made by a mistake of dollar amounts, as David Stockman did, by appropriating $1.46 trillion more over a four year period to the Pentagon.[28]

<u>I-6</u> Before mid-October 1972, the various comments are submitted to the Office of the Under Secretary of Defense, Policy (only two weeks for comments and review from NSC, DoS, OMB!). Where

possible, various issues raised by the comments are resolved between the various staffs and incorporated into an updated Policy Guidance section of the Defense Guidance. Other issues are identified as requiring Defense Resources Board (DRB) review and resolutions.

I-7 In late October 1972, the DRB meets to resolve the remaining issues and to review and approve and/or modify the updated Policy Guidance section of the Defense Guidance. Once again, due to the organisational structure of the DRB, the Secretary of Defense is absent.

I-8 Also in late October 1972, the Office of the Under Secretary of Defense, Policy, revises as necessary, the updated Policy Guidance section of the Defense Guidance.

I-9 Meanwhile, in September/October 1972, the Under Secretary (formerly Director) of Defense, Research and Engineering, and the Office of the Assistant Secretary of Defense, Manpower, Reserve Affairs and Logistics, in co-ordination with the Office of the Assistant Secretary of Defense, Comptroller, the Office of the Director, Program Analysis and Evaluation, and the staffs of the DoD Components, the Office of the Joint Chiefs of Staff and the Office of the Secretary of Defense, prepare a draft Resource Planning Guidance. At the same time, the Office of the Assistant Secretary of Defense, Comptroller and the Office of the Director, Program Analysis and Evaluation prepare a Tentative Fiscal Guidance. Essentially, these people and their staffs have begun the process of determining which programs, whether new or existing, are financially viable.

I-10 In early November 1972, the draft Resource Planning Guidance and the Tentative Fiscal Guidance are forwarded to the Office of the Under Secretary of Defense, Policy. Based on these documents and the revised Policy Guidance section of the Defense Guidance, the Office of the Under Secretary of Defence, Policy, prepares the draft Defense Guidance.

I-11 Also in early November 1972, the draft Defense Guidance is returned again to those who had earlier commented on it (Step I-5) - the DoD Components, the Commanders of the Unified and Specified Commands (CINCs), the NSC staff, the Department of State and the OMB for review and comment on the Resources and Tentative Fiscal Guidance sections of the draft Defense Guidance.

I-12 By mid-November 1972, the various comments are provided to the Office of the Under Secretary of Defense, Policy, (again, only 2 weeks to receive reviews and comments from NSC, DoS and OMB!). Again, where possible, issues raised by the comments are resolved between the various staffs and the Defense Guidance is revised, as necessary. Issues requiring DRB review and resolution are identified. At the same time, the Office of the Under Secretary of Defense, Research and Engineering, and the Office of the Assistant Secretary of Defense, Manpower, Reserve Affairs and Logistics, prepare briefings on the resources issues of the draft Defense Guidance.

I-13 In late November 1972, the DRB meets to review the revised draft Defense Guidance, the various comments on the draft and to resolve the remaining issues of the draft. The DRB is also briefed on the resources, implications and constraints of the revised draft Defense Guidance. At this stage, this review and briefing provide early insight into areas of strategy-capability mismatches and risks. In some cases, the DRB may recommend that the SECDEF request an actual increase in resources to reduce the mismatch and risks. The DRB "estimates risks when ends and means refuse to match, and recommend adjustments for consideration by the SECDEF".[29]

I-14 In late November/early December 1972, as a result of the previous DRB review and briefings, the Service Secretaries, Office of the Secretary of Defense, Membership of the DRB and the Joint Chiefs of Staff are tasked, as necessary, by the Deputy Secretary of Defense to develop proposed alternative solutions to reduce the identified risks. Again, it would appear that it is the Deputy Secretary of Defense who is the man who runs the Pentagon, especially considering that he might have to task the Office of the Secretary of Defense to propose an alternative solution. Obviously he, being Chairman of the DRB, would be cognisant of all the deliberations thus far, more so than the Secretary of Defense. However, the suggestion is that in such a circumstance it proves to be politically embarrasing for the SECDEF to receive a request of this nature. Arguably, this could yet be another political pressure on the SECDEF not to align himself or get especially close to a new programme which would impair his prestige if a better alternative is found. This is an indication of the political forces exerted from within, but also it is an indication that he is best off keeping his hands clean for outside consumption by letting those underneath him make the decisions.

I-15 In early December 1972 (sometimes January 1973), these proposed solutions are presented to the DRB. As a result of this review, the DRB develops its recommendations for changes to the revised draft Defense Guidance.

I-16 By mid-December 1972, the Office of the Joint Chiefs of Staff, based on the revised draft Defense Guidance and the DRB recommendations, prepares tables of expected major forces which it estimates will minimise the risks involved and an assessment of the risks associated with their ability to carry out the strategy contained in the DRB recommendations.

I-17 In mid-December 1972, the DRB decisions on major issues that result in changes in guidance emphasis/force mixes are reflected, by the Office of the Under Secretary of Defense, Policy, in an updated draft Defense Guidance. At this time, the Office of the Under Secretary of Defense, Policy, also prepares a list of any unresolved problems and/or issues.

I-18 At the end of December 1972, the updated draft Defense Guidance, the DRB recommendations as to mismatch and risks, the associated Office of Joint Chiefs of Staff force tables and risk assessment and any unresolved problems and/or issues are reviewed and resolved by the SECDEF. Most issues are already resolved before SECDEF final review.

I-19 In early January 1973, based on the updated draft Defense Guidance and the SECDEF decisions, the Office of the Under Secretary of Defense, Policy, prepares a proposed Defense Guidance.

I-20 In early January 1973, the proposed Defense Guidance is presented to the SECDEF for review and approval.[30]

Throughout the planning phase, the basic theme is that those concerned take the previous year's Defense Guidance, amend it through the co-ordination of various military and Executive agencies and produce, in a period of roughly less than six months, an updated version which reflects any new changes in forces/strategy. Although the time devoted to the planning phase is relatively short, it is not to be envisioned as working from "scratch" for the three following reasons. First, in Phase I-1, the Commanders of the Unified and Specified Commands (CINCs) begin their work based on the previous year's Defense Guidance. Second, the process is an ongoing phenomenon. For example, the DoD Components, who had been assisting the Joint Chiefs of Staff in preparing the JCS Joint Strategic Planning Document, are now placing the final insertions into that document, whilst they are outlining and drafting the next. Third, and discussed below, are the influences exerted by the overall Fiscal Cycle overlapping which permits trade-offs in planning/programming. Thus DoD Components will be attempting to insert a project, which they may have traded-off in a previous budget.

Itemising the twenty steps of the planning phase raises several issues. It demonstrates that the system is very compartmentalised, with various actors assigned specific functions and a schedule to adhere to, and that there are many people involved in the decisions. This leads to decision trade-offs, sell-outs, backscratching, incrementalism, bureaucratic inertia, et al. However, at this stage, the important consideration is not the many people or individuals involved as much as the organisation as a whole, for two reasons. The first is, that the gentleman in authority (Secretary of Defense) is not as involved in preparing the Defense Guidance, as are those with a longer period of tenure. As Janis has pointed out, the longer the stay of an individual with an organisation the greater the alignment to that organisation's esprit de corps.[31] Second, although each of these organisations begins the process with the same previous year's report initially, their views and opinions of the necessary changes to the Defense Guidance clash. However, without disagreement of policy, the essence of the entire exercise will be lost. This procedure is a secure methodology to compromise. For example, the CINCs will originally have a different view than that of the OMB on a weapon system, and these are resolved within the confines of the Defense Resources Board. There is the overall preoccupation that although the views of the organisations may differ on the numbers and material, they should eventually agree on an acceptable level for the overall security of the nation, which is to be expressed in the Defense Guidance for the eventual budgeting of defence. In other words, it is arguable that, at this stage, the preparation of the Defense Guidance appears to be less politically oriented (in the sense of top management involvement). Particularly,when considering that fact,there is the absence of the Secretary of Defense throughout most of the proceedings. Second, as witnessed, the Joint Chiefs of Staff, although politically motivated, are reliant on their DoD Components. Third, there are little if any outside political forces to bear, for example, the Congress, and the Media. The influx of political pressure, for example, the review and comments of the DoS, NSC and OMB apparently only skim the surface by devoting so little time to the process. Fourth, and discussed below, is that when the actual budgeting is being considered, more emphasis is placed on the Program Objectives Memorandum than on the Defense Guidance.

It is the opinion herein that the Defense Guidance, although important in itself, is more of an organisational output than that of a highly politicised bureaucratic output, but in the next stage of the Planning, Programming and Budgeting System, the Defense Guidance acts as an input into the Program Objectives Memorandum which reflects a more bureaucratic decisional output.

Another point of interest is that the Secretary of Defense, although the final arbiter, could be argued to be less of an influence than that of the Defense Resources Board which is chaired by the Deputy Secretary of Defense. Throughout each step, the DRB is reviewing and resolving differences arising from other key inputs. Moreover, the Secretary of Defense, being politically astute, would rather manage and be kept appraised of the process as a whole and its outcome than become embroiled with political in-house arguments. If he strives to be involved in each and every weapon system, from the very start, in the hope of avoiding such political squabbles, his ability to manage the overall Department, as well as his abilities to be concerned with the larger political issues, would suffer. However, most of the members of the DRB are political appointees, so in the case of a new Administration taking office is everyone "learning" simultaneously? If so, who or which group is constant? It is debatable that a "constant" might be found within the Joint Chiefs of Staff whose Chairman is also a permanent member of the DRB. However, caution should be exercised, because the chairmanship of the Joint Chiefs of Staff is first determined on a rotational basis; but, more importantly, the DRB plays a greater role in the planning of joint strategies/force requirements than do the Joint Chiefs on their own. The suggestion herein is that a "constant" is found within the professional bureaucrats (military and civilian) of the Department of Defense (DoD Components), especially when considering that the Office of the Joint Chiefs of Staff is so heavily dependent on the DoD Components. However, more examination of the whole process is required, bringing the discussion to the second phase of the Planning, Programming and Budgeting System (PPBS).

II. <u>Programming Phase (January 1973 to August 1973)</u>

<u>II-1</u> In May 1973[32] using the Defense Guidance as its margin, each of the DoD Components submits a Program Objectives Memorandum (POM). The purpose of the POM is to recommend, annually, the total resource requirements within the parameters of the published SECDEF fiscal guidance, contained in the Defense Guidance.

Essentially, the POM is the instrument through which programming, under fiscal constraints, is implemented, It is also the primary means of requesting revision to the SECDEF approved programmes as published in the Five Year Defense Plan (FYDP).[33] Specific procedures for developing each POM submission are provided annually. The POM represents a comprehensive and detailed expression of the total resource requirements associated with the total commitment of each DoD Component. Assessment of risks and military advantages of the proposed programmes, as measured in the FYDP, must be addressed. Supporting detail is prepared in Program Element (PE) displays as well as a wide variety of other displays required by the Office of the Secretary of Defense to analyse POM content.[34] During the Programming Phase a greater role is played by the Secretary of Defense. Although much of the arbitration is still conducted by the Defense Resources Board under the direction of the Under Secretary of Defense, more involvement by the Secretary of Defense will be exhibited here than in the Planning Phase. This holds true, because the process is beginning to move closer to the budgeting phase, where the Secretary of Defense acting as manager must be viewed as being cognisant of such preparation. Further, the SECDEF, acting as a politician, must be in the know as to which systems are politically viable, which will facilitate him in his future decisions. This may appear contradictory to what was previously said of the SECDEF during the Planning Phase. However, as will be illustrated he is concerned with three different budgets simultaneously, (See, Fiscal Cycle Overlap pp. 139-141) for thousands of weapon systems all at different stages, causing him to be reliant on the expertise below. More importantly, this one of the three budgets is at an earlier stage than the other two (Congress is not yet involved). Therefore, the SECDEF will be more involved with a budget, undergoing enactment by Congress, than the one at this earlier stage; as well as the SECDEF more involved with Programming than Planning. The suggestion now is that as the process moves towards budgeting and funding the more politicised the system becomes. New systems under consideration (R&D phase), must have a raison d'etre or be legitimised to fit within the context of the national defence to meet a requirement.

II-2 In June 1973, copies of each Program Objectives Memorandum (POM) are provided to the Defense Review Board (DRB) members. Based on its review of the POMs, the Office of the Joint Chiefs of Staff prepares its joint Program Assessment Memorandum, the second most important document from the Joint Chiefs in their role of the Joint Strategic Planning System.
The fact that the Joint Program Assessment Memorandum is forwarded (see II-3) to the Defense Resources Board for review in a matter of days, is further proof that the JCS depend on the DoD Components. It would be incorrect to visualise the Joint Chiefs of Staff awaiting their copy of the Program Objectives Memorandum (POM) in the Pentagon, reviewing and revising, and forwarding it to the Defense Resources Board. In reality, the DoD Components, while

drafting the POM, are also drafting the Joint Program Assessment Memorandum. This is also an indication that the professional civilian-military DoD Components are very influential in the decisional process.

II-3 In June 1973, the Joint Program Assessment Memorandum is forwarded to the Defense Resources Board (DRB) members. The members' staffs of the DRB, after reviewing the Program Objectives Memoranda (POMs) and the Joint Program Assessment Memorandum, identify issues raised by this review. As many issues as possible are resolved between the DRB members' staffs and the DoD Components and the Office of the Joint Chiefs of Staff. Issues which cannot be resolved are documented as ISSUE PAPERS for insertion into the Final Issue Books.

Issue Papers are based on the analyses of the annual POM submissions. The DoD Components within the Office of the Secretary of Defense evaluate them in terms of their relation to the guidance provided by the SECDEF in the Defense Guidance, the balance between force structure, modernisation and readiness, and efficiency trade-offs. The Issue Papers also define the issues, list alternatives, and evaluate the capabilities and costs of those alternatives in terms of their ability to accomplish DoD missions. Issue Papers are circulated to the Joint Chiefs of Staff and the DoD Components for comment, prior to being submitted to the SECDEF for decision. In part, the Issue Papers help form the basis for the SECDEF's Program Decision Memoranda (PDMs).[35]

II-4 In June 1973, copies of the FINAL ISSUE BOOKS are provided to the Defense Resources Board (DRB) members for review and brief executive-level comments. This brief executive-level review includes the Secretary of Defense so as to inform him of the DRB's actions.

II-5 In July 1973, the assembled ISSUE BOOKS and comments are provided to the Defense Resources Board (DRB) for review. After review, the DRB determines its position on the Program Objectives Memoranda (POMs). These positions are recorded in a set of Program Decision Memoranda (PDMs). A separate Program Decision Memorandum (PDM) is issued for each POM to each DoD Component. The PDMs are prepared by the Office of the Director, Program Analysis and Evaluation, under the direction of the DRB. Supplemental PDMs may be issued by Assistant Secretaries of Defense and other Directors to expand individual mission or functional areas.[36]

Issuing separate Program Objectives Memorandum and separate Program Decision Memorandum to each of the DoD Components means that each of them receives their instructions as to the parameters that have been set before actually entering into dollars and cents. This has been done under the auspices of the Director, Program Analysis and Evaluation, whose office is of most importance.[37] It is that office which is in charge of evaluating the performance of new or existing weapon systems, evaluating alternative systems, testing the feasibility of new technologies, setting the goals to be attained in a new system and so forth. This must be accomplished within the preoccupation of national security and fit within the context of the overall strategy and requirements to meet the requirement. "The SECDEF falls back on civilians in OSD Program Analysis and Evaluation (PA & E), who have found favor for more than 20 years, as architects of joint strategies constrained by available means."[38] Essentially, and with little fanfare, it is this office which is constantly legitimising the needs of various weapon systems. There are three major reasons for a contractor to take a special interest in this office and they are as follows. First, it is within this office that the so-called "bail-out" process occurs. For example, General Dynamics became the prime contractor for the F-16 after this office determined that Northrop's design was not as good, yet years later it was this same office which awarded Northrop's same design with an additional two fins to become the Navy's F/A-18. Second, this office reflects any of the changes in strategies or force requirements. It is crucial for any lobbyist in Washington representing weapons contractors to be kept informed of these changes, which could determine whether or not a contractor's new system has a chance, or why an existing one may be cancelled, phased out, or increased. Third, the Office of the Director, Program Analysis and Evaluation, is the last office involved in the Programming Phase - making it important because the next stage is the budgeting.

III. <u>Budgeting Phase (August 1973 to January 1974)</u>

<u>III-1</u> In August and September 1973, the Department of Defense (DoD) Components, based on their Program Objectives Memoranda (POMs) and the Defense Resources Board's Program Decision Memoranda (PDMs), prepare their

proposed budgets. Towards the middle of September, these proposed budgets are submitted back to the Defense Resources Board (DRB); and following their review, positions on the proposed Budgets are determined by the DRB. These positions are recorded in a set of proposed Program Budget Decisions (PDBs).[39] The DRB prepares a series of these Program Budget Decisions (PBDs) which are then submitted to the Deputy Secretary of Defense for review and approval in October and November 1974. Arguably, the influence of the Secretary of Defense is lacking at this stage. The suggestion is that the Secretary of Defense would prefer to distance himself temporarily from the politics, which would be exhibited by inter-Service rivalry of the DoD Components until the majority of it has been resolved. Moreover, as mentioned earlier, in managing the entire Department of Defense he would not have time to become embroiled and held down by such in-house fighting. This suggests that, should he have a certain opinion of maintaining or increasing funds for a given system, he would direct that opinion through his Deputy Secretary of Defense. Essentially, "the Deputy SECDEF is the man who runs the Pentagon".[40]

III-2 In October and November 1973, aside from the Deputy Secretary of Defense reviewing the Program Budget Decisions (PBDs); the PBDs provided by the Defense Resources Board (DRB) are passed back to the Department of Defense DoD Components. This is a significant phase because not only do the DoD Components have a chance to prepare for items that they are in disagreement with the DRB (which become "appeal issues") but, more importantly, they can do this with the knowledge of how the Office of the Deputy Secretary of Defense is proceeding on those issues. This permits the DoD Components to prepare various strategies or scenarios in the hope of being coeposetic with the Deputy Secretary of Defense. In November, these appeal issues are presented to the Defense Resources Board for review and resolution.

III-3 In early December 1973, the Defense Resources Board (DRB) meets to review the proposed budget. Based on this review, the DRB prepares its recommendations to the Secretary of Defense (SECDEF) and submits them to the SECDEF in mid-December. The SECDEF, in turn, makes his recommendations to the President who, after review, provides the SECDEF with his final budget guidance. The President himself does not submit the budget, but his opinions and those of the National Security Council and the Department of State's have been worked into a budget through the Office of Management and Budget. And it should also not be thought that this budget should differ greatly from that of the Secretary of Defense, because, as this is an ongoing process, the military inputs or links have been made to the Executive through the Joint Chiefs of Staff, who maintain a seat on the National Security Council. Furthermore, communications are constantly flowing between the Department of Defense and the Executive Branch of government.

<u>III-4</u> In mid-December 1973, the whole process, appearing quite disjointed, suddenly gels. Based on the approved Program Budget Decisions (PBDs), the DoD Components' Program Budget Decision (PBD) appeal issues, and the President's final budget guidance provided to the Secretary of Defense, the Defense Resources Board (DRB) meets to establish the final budget guidance for the DoD Components. The DoD Components review their earlier submitted proposed Budgets and the approved Program Budget Decisions (PBDs) and appeal issues, and based on the final budget guidance, prepare their proposed Final Budgets. This is completed within a period of one week! Clearly, the majority of the budget decisions had been reached earlier. In fact, it is said that this stage is only formal, because in actuality, the decisions had been reached earlier in October/November (see Stage III-2).[41] Moreover, this period has actually been said to have nothing to do with the present budget, except to count wins or losses, and prepare in-house reports for next year's budget, because, already work is being prepared due to the overlapping of the entire Fiscal Cycle, discussed below.[42]

<u>III-5</u> In late December, the DoD Components' proposed Final Budgets are forwarded to the Office of the Assistant Secretary of Defense, Comptroller (OASD)(C), who combines them into a single proposed Final Department of Defense Budget. This is then submitted to the Secretary of Defense for review and approval. At this stage, the Secretary of Defense should now have

a complete picture of the budget requirements and be formulating his arguments for the enactment process.

III-6 In early January 1974, the Final Department of Defense's Budget is then forwarded to the Office of Management and Budget (OMB), where it is incorporated into a single National Budget, approved by the President and then submitted to the Congress for enactment.

IV. Enactment

Congress, as mentioned earlier, does not participate directly in the process of defence planning. Its role is that of resource allocation and concept critic which it performs by its Authorisations[43], Appropriations[44], and Oversight[45] capabilities. Further, "policy controversies" in Congress regarding defence programmes "are seldom made with any finality ... which inhibits [its] efforts to establish sharp definitions of purpose, policy, and strategy that might enhance the clarity of guidance for the national security planner".[46]

Regarding its role of resource allocation, it is "an article of faith among political observers that Congress possesses ultimate control over executive actions, because 'it controls the purse strings'."[47] This is true, however, whether it is exercised is another story. "Congress is extremely slow to exercise this prerogative. Nowhere is this clearer than in the area of the defense budget."[48] The purse strings argument, which implies a rational decision made on the merits of a given programme, is "particularly unsatisfactory when it comes to the yearly appropriations for our defense establishment".[49] For example, Congress could reduce military spending by making any one of a hundred or so possible cuts in the Pentagon's budget. "However, this almost never happens. The Pentagon generally comes away with everything it wants, and sometimes more besides."[50]

Regardless, Congressional review of the Defense portion of the President's Budget is undertaken from the separate standpoints of Authorisation of programmes and Appropriation of funds. Annual authorising legislation is required for appropriations for : major procurement items (for example, aircraft, missiles, naval vessels); Research, Development, Test and Evaluation (RDT&E); authorised military personnel and strengths; and for the authorisation of military construction programmes. Authorisation legislation is prepared by the Armed Services Committeesof both the House and the Senate; and the Appropriation legislation by the Defense Sub-Committees of the House and Senate Appropriations Committee. A description of the Authorisation process is found in footnote [51]. The Appropriations process is similar to the Authorisation process and is found in footnote[52].

Congressional decision making is dominated by the committee system which currently includes 38 standing committees. (For a list of the committees relevant to weapons procurement refer to footnote 95, found in Chapter 1.) On the one hand, the committee system has allowed for power centres to "proliferate, but decision making became immensely more difficult, because no faction, official or informal, can deliver consistently".[53] More shall be said of Congressional activity in the following Chapter, but the important aspect to be aware of is that although they do not participate in defence planning directly, a programme is dependent on Congressional approval and funding. Once a programme is funded, the Apportionment Process follows.

V. Apportionment Process/Execution

V-1 The Apportionment Process (not to be confused with Appropriations Process) normally takes place in late September, early October, as the Appropriations Bill is finalised, and passed by Congress and signed by the President into law. Apportionment is based on Presidential Guidance and reflects his control and restrictions. At the same time, the Treasury issues a series of Warrants to reflect the types and amount of funds available. The actual Apportionment process is exercised through the Office of Management and Budget which provides guidance to the various Executive departments and agencies based on the President's Guidance and Treasury Warrants. Apportionment is designed to prevent over obligation and funds are made available on an annual, quarterly or other periodic basis.

V-2 Based on the guidance that is received from the Office of Management and Budget, the Office of the Secretary of Defense provides its guidance to the DoD Components. The Apportionment Process and the Apportionment Requests (from DoD Components) also serve the important function of updating the DoD Components' budgets which were submitted to the Office of the Secretary of Defense over a year earlier. In other words, the Apportionment Process of September/October 1974 is dealing with a Budget from DoD Components (proposed in August to September 1973). However, simultaneously with the Apportionment Process of September/October 1974, the DoD Components are proposing their budgets for 1976. More of this is discussed below in Fiscal Cycle Overlap.

V-3 Apportionments are made on the basis of hearings conducted by the Office of Management and Budget (OMB), the Office of the Secretary of Defense, and the DoD Components, wherein Apportionment Requests are considered. In the absence of an enacted appropriation, the Secretary of Defense (SECDEF) establishes authorised obligation rates for each appropriation. After the Appropriation Bill is enacted, and the apportionment is released by the OMB, the apportionment becomes the SECDEF's authorised obligation rate.

V-4 Following the establishment of the rate of obligation by the Secretary of Defense (SECDEF), the DoD Components allocate funds to the responsible officials in their organisations. These allocations are usually subdivided into sub-allocations, allotments and sub-allotments, or are included in operating budgets to make funds available for commitment, obligation and expenditure. A commitment is a reservation of funds based upon currently directed use of funds leading to obligations. An obligation is a liability, for example, a firm contract for goods or services. An expenditure is

> payment of an obligation. Allocations, commitments, obligations and expenditures are controlled to avoid overspending.[54]

Once the Secretary of Defense has submitted his Budget to the Office of Management and Budget (OMB), the role of Deputy Secretary of Defense seems to all but disappear. Although he is seen also participating in other roles, for example, he accompanies the SECDEF to Capitol Hill for Congressional Hearings; the suggestion is that he has not abdicated his influence in the overall process, for two reasons. First, it is now the duty of the Secretary of Defense to appear in full control and manage the remainder of the budgetary process through the political jungle of Congressional Committees and Sub-committees and the scrutiny of the OMB. Essentially, his political talents are tested during this process, which unfolds in a <u>very</u> public arena. He must be viewed to be in control. Also, the Secretary of Defense communicates directly to the DoD Components during the Apportionment and allocation of funds, which creates the impression that he is completely in command, acting as manager and distributing the funds directly to the parties concerned. This line of communication in actuality is maintained by the Office of the Secretary of Defense with the DoD Components. A more tangible reason for the SECDEF to be in direct communication with the DoD Components, is that if a change should occur in the requirements of men or material, he can make adjustments with the various financial control techniques available to him. These techniques are discussed shortly, but any changes, unless the resultant of unforeseen events (outbreak of hostilities), will be identified as emanating from below. Even changes in finances will involve the Deputy SECDEF, before the SECDEF is briefed.

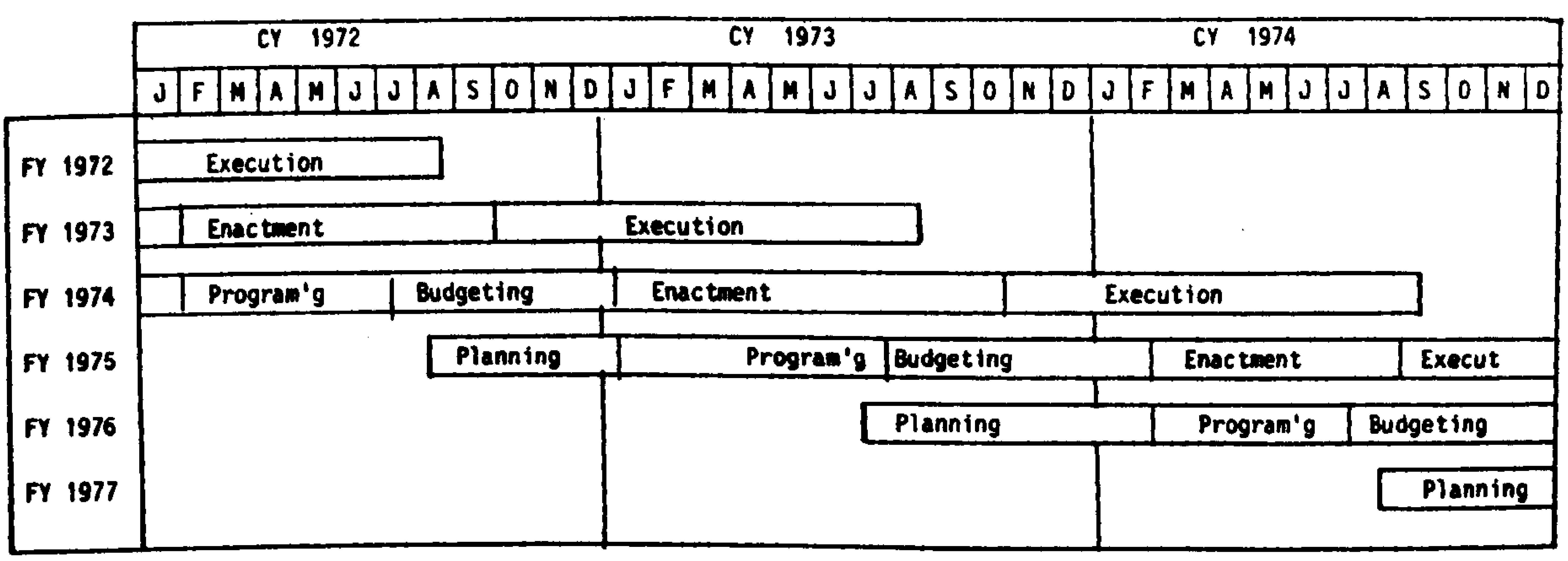
The second reason for the disappearance of the Deputy Secretary of Defense is that he and the Defense Resources Board (DRB) have already begun considering the next two years' budgets. The two budgets respectively are simultaneously at two different stages, not to mention the additional budget that was just submitted. This supports an earlier claim that the Secretary of Defense does not have the time to concern himself with two other budgets, whilst he is trying to argue the present one through Congress. However, it does permit the SECDEF the knowledge that if funds should be cancelled by Congress for a given programme, he can direct his Deputy Secretary to review and/or insert the programme into future budgets. This increases his chances of manoeuvring various projects.

Fiscal Cycle Overlap and Budgetary Issues

As mentioned earlier, it takes over two years for the annual Fiscal Cycle, from the Commander in Chiefs' (CINCs') inputs to the Secretary of Defense until the final passage and signing of the Appropriations Bill. As a result, therefore, there are always three different fiscal years' budgets which are active. See Figure 3-II below, where this budget overlap is shown graphically.

FIGURE 3-II

Fiscal Cycle Overlap



* CY = Cycle Year
* FY = Fiscal Year

For example, Stage III-4, whilst the DoD Components are preparing their Final Budget, they are also preparing for next year's planning (See Figure 3-II). Various trade-offs usually appear between the Services, with the knowledge that a loss this year could mean a win next year, or vice versa. Fiscal Cycle operlap can be a benefit to the DoD. In short, it is an evasion of financial controls exerted by Congress. For example, in the case of the F-16, in 1972 Congress imposed language in its appropriations to the Air Force and Navy that they strive for commonality in their aircraft, or lose funding. Both the Air Force and the Navy were against such controls exerted upon them, because each envisaged a different role for themselves, in relation to their respective aircraft performances. Meanwhile, other monies were appropriated through the Office of the Secretary of Defense, and changes were made in the programmes scheduling, until the arguments of the commonality advocates in Congress fell on deaf ears.

The suggestion is, that Fiscal Cycle overlap is an organisational technique, which affords not only trade-offs, but lessens the uncertainties of a weapon system, from the perspective of the contractor, as well as the DoD Component concerned. This is especially apparent during the Concept Exploration phase (and also during Demonstration and Validation) where trade-offs of requirements and available technology occur. If funding for a contractor working in conjunction with the DoD Components is not realised, the requirements can be altered for review in another budget. Or funds, outside of the scrutiny of Congress, are made available from the Office of the Secretary of Defense.

As mentioned earlier, the Secretary of Defense is in direct communication through the OSD and Deputy SECDEF with the DoD Components allowing him various financial control techniques. One financial control technique used by the Office of the Secretary of Defense (OSD) is to defer approved programmes until later in the budget execution period. This can either be utilised to restrict the flow of funds into the economy, as well as to control programmes by withholding funding authorisation until complete justification is provided. An example of controlling a programme occurred to the B-1 bomber. Due to leaks in the fuel tanks, the Air Force froze funds to General Electric via the SECDEF. Another OSD technique is the imposition of recoupment objectives on the military departments. A recoupment objective represents the amount of money that OSD estimates can be saved in the construction, procurement and research, developing, testing and evaluation (RDT&E) accounts in current or prior year programmes.[55] Although this is used, the recovery by such reduction is seldom realised. If anything, the cost increases, which is expounded upon below. However, for the purposes of this discussion, the suggestion is that it is a technique to appear on paper as reducing cost in a given fiscal year, and, after reaching a threshold caused by prior investment, increase in funding is usually the resultant.

The Secretary of Defense (SECDEF) has the authority, with the approval of the Office of Management and Budget (OMB) to transfer funds from one appropriation to another if such transfers do not exceed statutory limits. This is argued on the grounds that it is the SECDEF and his office and departments who are better qualified than, say, Congress to meet any changing needs during a given Fiscal Year. However, it has been the author's experience that this is a way of either by-passing Congress or keeping any expected Congressional opposition to a minimum. Aside from the transfer authority, another method available is the Supplemental Budgets (or Deficiency Budgets).[56] Supplemental and Deficiency Budgets are in essence additions to the annual budget proposed by the SECDEF to request funds for major unforeseen emergencies during the current year. For example, after the fall of the Shah of Iran, the transitional Bakhtiar Government cancelled US military equipment (already on order) worth $7 billion in February 1979.[57] To alleviate the burden on the contractors for equipment already produced, the Carter Administration requested and received a supplemental budget of $2.2 billion.[58]

A further method by which the DoD exerts budgetary control is by means of Reprogramming.[59] This procedure involves the re-application of funds between programmes within a particular appropriation. Dollar limits, referred to as thresholds, which are set by Congress, dictate who may approve the re-application of funds. In other words, changes which exceed certain thresholds, or which meet other substantive criteria, require notification or prior approval of Congressional Committees. Obviously, this is not a technique to employ in order to bypass Congress, especially when over the past two decades Congress, has been exert~~s~~ing tight dollar thresholds, but there is still some room for manoeuvreability.

By far the most important techniques, and least probably noticed, is that the SECDEF has a separate emergency fund for research and development (R&D)

programmes.[60] The amount is authorised by Congress, and varies from year to year. Aside from DoD having relative freedom in applying these funds to various weapons systems without Congressional scrutiny, the importance lies in the fact that by doing so, and the amount, is a gauge or litmus test for future systems. Of course, the "amount" varies : for example, amounts for emergency R&D funding for a new rifle are considerably less than emergency R&D funding for an aircraft wing design. But by authorising funds to a programme and how many times, is a very good indication that a given system has won the merit of the DoD. For example, in the case of the F-16, before Congress had its first chance to review the General Electric engine in the FY 1972 Budget, $30 million had already been spent by General Electric and "independent (emergency) R&D funds".[61] Also, operational to having received these funds, was the advocacy of the fighter mafia and the support of Mr David Packard, then Deputy Secretary of Defense.[62] Advocacy of a programme plays a role in any of the stages and techniques, or for that matter, in any type of decision. However, advocacy found within a stage or technique which affords the DoD the greatest manoeuvreability, and the least constraint, provides a good measurement of a weapon system's chances of final approval. Moreover, advocacy and the support granted it in the form of monies appropriated, yields credence to a weapon system in its earlier phases, and also increases the amount invested, bringing it closer to a threshold where it is difficult or unacceptable to cancel a programme.

Before considering the Life Cycle of a given weapon system, in the next Chapter, an important management tool used for decision making within the Fiscal Cycle, as well as the Life Cycle needs to be mentioned. This is the Five Year Defense Plan (FYDP). The FYDP is the publication that records, summarises and displays the decisions that have been approved by the Secretary of Defense, as constituting the Department of Defense's programme. It is a management tool that keeps management informed of what has been accomplished in the past and what is to be planned in the future, to support the national strategy decisions. The FYDP includes an identification of force and support data, which has its programme structure on a foundation of mission and support related programmes.[63]

The Five Year Defense Plan (FYDP) is not a document published every five years, setting the parameters by which the decision makers may operate. In fact, the FYDP is updated at least three times a year. There are at least 15 different FYDPs in a given five year period. The interesting point is that the changes coincide with the developments of the Fiscal Cycle, not only within one cycle but three in progress concurrently. The first major update takes place in October, after Congress has enacted the new fiscal year's Appropriations Bills. The second update takes place the following January, based on the President's submission of his next year's Budget (to be reviewed and acted upon by Congress the following October). The third update takes place in May, based on the Program Objectives Memoranda (<u>See</u>, II-1 in text above) which will eventually be part of a budget to be reviewed and acted upon by Congress a year and a half later. A better way to view the 3 major updates is that the first is the result of a given Fiscal Year's (FY's) budget; the second update the result of developments of a FY+1 budget; the third update the result of a FY+2 budget. Thus, the obvious point is that the overlapping of the Fiscal Cycle (three active budgets) affects the Five Year Defense Plan (FYDP). However, the subtle reality is that instead of the FYDP acting as a guidance, it can be a tool used by management. Consider the following - the Department of Defense (DoD) on a whole provides the major inputs into the FYDP. However, historical data shows that the Dod's Five Year Defense Plans are consistently undercosted.[64] A report prepared by the General Accounting Office furthermore states that "one of the major contributing factors is a systematic bias in DoD cost estimating practice that encourages the use of optimistic cost assumptions while excluding actual cost experience and the reality of the budgeting process environment".[65]

DoD is responsible for estimating out-year costs (years two through five of the FYDP) and usually bases its estimate on the view that the costs will decrease as more and more units are produced. This represents a simplistic price and quantity relationship, which is in essence, the more you produce, the less additional units cost. This relationship is referred to as the "learning curve" or as the "experience curve", or as the "progress curve". Primarily, this emphasis enables planning for greater quantities with similar or lower projections of funding in the out years of the FYDP. This type of planning is based on planned costs decline, but in reality actual cost growth becomes evident. DoD often forecasts the declining future costs commonly using the models of 90, 85, or 80 percent learning curves. For example, by applying a 90 percent learning curve formula, DoD projects constant dollar cost declines of 10 percent as cumulative production doubles. The constant dollar forecast is then inflated using the DoD procurement inflation index - simply, that is the forecast on which the FYDP programme estimates are based. However, estimating costs in this fashion neglects a basic maxim of defence economics, which is, defence plans have a propensity to change and systems do run into trouble. These changes are "very expensive since they reverse the normal trend of the production learning curve".[66]

Congress, having realised this years ago, required the DoD to make available a quarterly Selected Acquisition Report (SAR) on the cost status of major weapon systems. These reports provide current DoD estimates of the total cost changes since the previous quarter. Thus, by comparing successive estimates with the original ones for major procurement programmes, it is possible to identify the extent of price increases and many of their causes. These Selected Acquisition Reports (SARs), however, do not give a complete picture of escalation in equipment costs, because the DoD changes the list of weapon systems reported on in different SARs, and, also alters its cost categories. Moreover, auditors of the General Accounting Office (Congress' watchdog agency) repeatedly charge the Pentagon for not complying fully with SAR requirements. For example, an audit found that in a 1976 SAR, the programme cost estimate of the F-16 fighter was understated by $260 million.[67] SARs are usually prepared for about 50 major weapon systems, but because SAR coverage normally begins after a system enters Full-Scale Development, many major systems in advanced development are excluded. In addition, most modifications to programmes are either excluded from the SARs or when they are reported, no explanation is offered to Congress. For example, a General Accounting Office Report[68] stated that in the "reporting system as of June 30, 1979" ... the "performance specifications were changed on two occasions for the F-16 without any explanation of the impact of the changes."69]

Cost overruns, or as DoD prefers to call it "cost growth", is not in any way unique to only the Five Year Defense Plan (FYDP) or the SAR - it permeates the whole of the Fiscal Cycle Processes. As former Deputy Secretary of Defense, David Packard, said in August 1970, "Let's face it - the fact is that there has been bad management of many defense programs in the past. We spent billions of the taxpayers' dollars; sometimes we spent it badly."70]

A brief review of past practices in contracting will shed some light on the problem of cost overruns. Development programmes were managed in the 1950s almost routinely in terms of crash programmes and massive cost overruns. The sense of urgency surrounding the US missile programmes in the 1950s, in particular, led to the practice of spending whatever sums were necessary to realise their deployment as quickly as possible. The major device used by the government to get defence firms to undertake these programmes, on a crash basis, was the "cost-plus-fixed-fee" contract, which transferred the risks of development inherent in the new systems from the defence firm to the government.71] The result of this contracting system was massive cost overruns. Studies performed by the RAND Corporation and the Harvard Business School found that in the 1950s the average weapon's cost was three times as much as expected.72]

Cognisant of the results, Robert McNamara revised the "incentive-type" contracts and "contract definition" to procure major systems in the 1960s. Essentially, the defence firm had no incentives to control the costs under the "cost-plus-fixed-fee" contracts, and McNamara and defence officials sought to create such incentives. Instead of guaranteeing a contractor a fixed profit, no matter how large his costs, they related profits inversely to costs: the higher a contractor's costs, the lower his profits; and the lower his costs, the higher his profits. "Contract definition" was initiated by the McNamara team[73] which tried to define a project more clearly before substantial sums were committed to it so that many of the uncertainties inherent in development programmes might be reduced.[74] "Contract definition" was essentially a competition carried on, usually between two companies, for a period of several months in order to determine which firm would receive the development contract. This led to each company preparing extensive technical designs and cost estimates on paper - one of these paper studies "stood eight feet high and weighed a ton".[75]

Thus, in the 1960s, "contract definition" and "incentive contracts" went hand in hand. The former was intended to reduce the risks in developing a weapon system by eliminating many uncertainties; the latter, to divide the reduced risks between the government and the firm chosen. Both devices should have reduced cost overruns - it did in the sense that cost overruns were on the average close to twice instead of three times the estimated costs of the 1950s. However, overall costs of a weapon system were not reduced. The point being that "incentive-type" contracts affected the overall prices of weapon systems. As stated, the "cost-plus-fixed-fee" contract of the 1950s pushed firms to underestimate their costs because they faced no penalty by doing so. In the 1960s, unrealistically low bids were replaced by unrealistically high bids because if a firm could negotiate a price with the government well above what they thought the programme could cost, they would make a larger profit than would otherwise be the case. If a defence firm has reduced its cost overrun by inflating the total contract price, overall cost has not been reduced.[76] Moreover, it is argued that the reduction of cost overruns was not due to any significant improvement in the efficiency of the weapons acquisition process itself, but rather to a reduced demand for technological advance under less urgent conditions. The weapon systems of the 1960s incorporated less technological advances than those in the 1950s; in other words, the urgency was being reduced, and the state of the art was not pushed so far. As a direct result, cost overruns were smaller.[77] The "cost-plus-fixed-fee" contracting of the 1950s and the "incentive/definition contracts" of the 1960s are still utilised today.

As a result of increased cost, the General Accounting Office (GAO) formed the Major Acquisition Group in mid-1969. The new group, established within GAO's Defense Division, was given the responsibility of making continuing reviews, on a current basis, of major weapon systems which are in various stages of the acquisition cycle. The review responsibility begins with the decision of the Secretary of Defense to commit substantial resources on a particular system and carries through the various stages of a weapon system. The Major Acquisition Group has two primary objectives :

(1) To identify the basic causes of weapon system cost growth, schedule slippage, and the deterioration of the originally expected performance characteristics; and

(2) the options available, in the remainder of a programme, in order to make recommendations for improvement.[78]

To accomplish these two objectives, the Major Acquisitions Group reports annually to the Congress in the form of a General Accounting Office Report. The majority of this report is based on the information provided by the DoD in its quarterly report - the Selected Acquisition Report (SAR). As mentioned above, the DoD reports what it judges to be necessary, thus creating a void in the information that the Major Acquisition Group may be seeking in attempting to control costs. Although the GAO reports include more information than the SARs, and the GAO has even been critical of the DoD's reporting in the SARs; an interesting relationship between DoD and GAO is demonstrated when discussing their reasons for cost overruns.

In 1971, during the developmental phase of the F-16, Deputy Secretary of Defense David Packard supplied the Joint Economic Committee of Congress with the following causes for cost overruns :

1) Engineering change - an alteration in the physical or functional characteristics of a system;
2) Quantity change - a change in the quantity to be procured;
3) Support change - a change in support item requirements;
4) Schedule change - a change in a delivery schedule, completion date or intermediate milestone of development or production;
5) Unpredictable change - a change caused by Acts of God, work stoppage, Federal or State law changes or other similar unforeseeable events;

6) Economic change - a change due to the operation of one or more factors of the economy;

7) Estimating change - a change in program or project cost due to refinements of the base estimate;

8) Contract performance incentives - a net change in contractual amount resulting from differences between the contractor's actual performance and that indicated by performance (including delivery) incentive targets;

9) Contract cost overruns - a net change in contractual amount ... not attributable to any other cause of cost growth previously defined.[79]

misManagement (or even deceit) on the part of the military-industrial partnership between government and industry is not identifiable in any of the nine definitions. Of course, it would not be in the best interest for the DoD to place part of the blame with itself or its fiscal system. However, since the Major Acquisition Group of the GAO was founded with one of its objectives to investigate the causes of weapon system cost growth, it would be expected that they should be the first to indicate a case of blatant mismanagement. However, in their first annual report, GAO in a study of 52 major weapons programmes offered a similar array of causal categories as did Packard in his definitions :

Cost Growth Elements	Percentage
New Quantity Changes	9.9
Engineering Changes	17.0
Support Changes	5.7
Schedule Changes	10.9
Economic Changes	16.7
Estimating Changes	25.8
Sundry	4.5
Unidentified	9.4
	99.9 [80]

Again, no mention of mismanagement as a cause of cost overruns. But, on a more interesting note, what is incredible is that GAO, and its Major Acquisition Group, acting as a watchdog agency for Congress, were unaware that Congress had heard testimony from an official of the DoD, one year earlier, pertaining to mismanagement problems. Former Assistant Secretary of Defense, Robert Anthony, provided the following list of cost overruns causes to Senator Proxmire's Joint Economic Committee in May 1970 :

1) Low initial cost estimates by contractors;
2) Concurrent development and production;
3) High overhead costs;
4) Inadequate cost accounting standards;
5) Profit determination as a percentage of cost;
6) Inadequate management control systems in the industry;
7) Lack of DoD interest in cost control.[81]

The above causes are a far cry from those voiced by Packard and the GAO, particularly the first, which implies deceit on the part of the industry when providing their initial cost estimates. It is probable that the reason for such deceit is competition. "Competing firms bid unrealistically low in the hope that, if they win, they will be able later ... to renegotiate back up to a more reasonable price level ...".[82] This process is known as "getting well" or "contract nourishment". However, all is not so one-sided on the part of the industry; some of the blame lies in the competition found within DoD. According to a Lockheed Manager : "A guy in DoD wants to get a program started. Realising he can't sell it unless it costs less, he will cut the estimate, sometimes unconsciously. The contractor does the same."[83] The contractor and the concerned DoD Components work closely, researching new technologies and matching requirements throughout the life of a weapon system. This is especially pronounced in the earlier stages. The case of the F-16 will suggest this, in that both the contractors and DoD Components provide low initial costs. Further, because the F-16 programme was a prototype programme, which also had its schedule of testing shortened, there was the problem of producing an aircraft, still under development, which increased costs. These and other causes of cost overruns will be discussed in the case of the F-16, but for now, the mismanagement of a programme comes from both the contractors and the DoD Components.

However, the issue of competition becomes very cloudy when considering that instead of truly competitive contracts, the "military services rely on 'sole source' negotiated contracts for up to 70 percent of their equipment programs."[84] Thus, a small percentage of military procurement dollars are actually awarded through price competition. For example, in 1975, only 30 percent of military procurement dollars were awarded through price competition, of any form, which had declined from 35.8 percent in 1971.[85]

An even lower amount of competition is demonstrated by comparing the methods used in private industry for bidding on contracts with that of the government. In private industry, a common method to ensure efficiency and competition is to advertise for contract bids. Specifications for a project are decided upon and contractors are asked to submit sealed bids. The lowest realistic bid able to meet the desired needs is usually accepted. This type of method is not used for over 90 percent of the Defense Department's purchases. In 1975, only 8.5 percent of all military procurement dollars were spent on contracts awarded through general market advertising.[86] Of course, it is obvious that it would be impossible to advertise openly for a contractor to develop and produce many systems where secrecy is at issue. On any account, secrecy is not really the issue. The suggestion is that the DoD Components work closely with the contractors, constantly researching and developing new technologies. As the emerging technologies begin to match a Service's requirements, the closer then that system is to becoming reality. This is discussed later in greater detail, but the point here is that there are limitations imposed on open competition because of this close working relationship where there are many cases of a Service's requirements actually conceived from evolving technologies - for example - the Stealth Technology.

The amount of competition is also debatable. In a letter to Secretary of Defense Caspar Weinberger, the GAO stated that, "DoD officials portrayed competitive rates for the first half of fiscal year 1981, ranging from a high of 69 percent in testimony before the Senate Committee on Armed Services to a low of 45 percent in their procurement statistics".[87] Further, the procurement statistics were "also revised to include certain competitive non-military awards and to exclude certain non-competitive military awards".[88] It was the GAO's opinion that "DoD's presentation of, and changes to, its statistics could even lead to a real decline in competition".[89]

In the overall procurement system, there is a type of competition which shall be referred to as "abridged competition". Instead of open competition, as found in private industry, a more narrowly prescribed form of price competition and a more widely used method of military contracting "competitive negotiated contracts" is common in this arena. In essence, a limited number of contractors are requested to bid on a project. Theoretically, the lowest bid able to tackle the project is selected. Aside from the necessity of secrecy in some systems, Defense Department officials have argued that "abridged competition" is necessary because open price competition is very difficult for very complex and sophisticated weapons, almost impossible in some programmes, such as electronics and aircraft development. Moreover, arguably, there are perhaps only two or three corporations able to meet required specifications, or maybe even just one. This argument of open competition versus abridged competition appears to be an especially moot point to an official in the Defense Department. As a researcher for US Aircraft at the Congressional Research Service said, "what difference does it make if its open competition or limited [abridged] competition - it's still competition."[90] Hpwever, "true competition does not exist at either the larger, prime contractor level or at the smaller, critical-component supplier level."[91]

The suggestion is that it is more than "abridged competition" but actually "predetermined abridged competition" whereby one who is selected for one contract has a lesser chance of winning the next contract of a similar weapon system. This is not simply due to competition in the sense of giving each contractor a piece of the pie. That is too simplistic. The lack of competition is brought upon the contractors by themselves. As in any organisation or business, there are limited resources available. Although the contractors are constantly researching available avenues to win contracts, it is impossible for them to be involved in all available options simultaneously. This is due not only to the close relationship the contractor has with the DoD Components but also, directly in correlation with the contractor's limitations in terms of his prior commitments to resource investment. The other dimension to be aware of is a political one - jobs. For example, General Dynamics and Northrop are two contractors able to construct fighter aircraft. Once General Dynamics had been awarded the contract for the F-16, it stood a lesser chance to win the next. Both companies had invested large amounts into the F-16 programme, but now that General Dynamics had been chosen, it would be devoting more resources to that programme. In the meantime, Northrop would be able to work with the Navy, and eventually be awarded the contract for the F/A-18.

On the surface, the above might also suggest that once General Dynamics had been chosen, Northrop was bailed out so as to preserve or increase jobs, and thus keep a large contractor economically viable. However, it is not as simple as that, for if Northrop were to argue solely on that basis, they leave themselves open to criticisms of being inferior to

General Dynamics for not having been selected originally. Another dimension which should be considered is the nature of the Fiscal Cycle (and also factors later seen in the Life Cycle), where three cycles are operating simultaneously, and if a contractor appears to be losing ground to another contractor on a given system, a shift in strategies takes place whereby that contractor concentrates on research and upcoming contracts, leaving the other contractor to fulfil its newly won contract. As stated, each contractor, no matter how large, has finite resources available to itself. Given the many hurdles outlined above, and the many more to be seen in the Life Cycle, it would be virtually impossible for a given contractor to allay interest for the award of every contract in a family of weapons.

The suggestion is that jobs and economics are a major issue but are operative in a more subtle manner. A large military contractor will subcontract out hundreds of smaller components, especially in a more complicated system, such as a new aircraft. Various strategies are worked upon where instead of appearing to be a contractor struggling to keep afloat it is better to shift that onus on to the many subcontractors struggling to stay ahead. Thus, instead of selecting your subcontractors to be "down the street" when considering final assembly, it is more fashionable to deal with those who are farther away. Although this might appear to make no economic sense, it helps to win the ultimate contract. The distance of the subcontractors ultimately drives up costs for the final assembly but given the system of the Life Cycle it is worth it. For the most part, excepting some of the methods used by the Secretary of Defense, the Congress ultimately holds the power of the purse. The simple economic equation works as follows : the more subcontractors found in different states will add votes from the House of Representatives and the Senate when they are concerned with the Authorisation and Appropriations Bills. This is where methods used by private business to drive down costs have no meaning to those dealing with military contractors. This simple equation works best in the House of Representatives where a Representative in any state would swerve away from cutting jobs in his home state or in his own constituency. A Representative's term is only two years and the latter half of his tenure is spent seeking re-election. A slate of keeping or increasing jobs, and being on record for doing so in his constituency, will translate into votes. Given the nature of a Representative's short term in office (two years compared to a Senator's six years), he/she more than his/her counterpart in the Senate has to be concerned with domestic issues.

It is not to be assumed that this strategy is pursued only on the part of the contractor. That is only half of the picture. Additionally, the "device of large scale contracting for the services of science and industry has become a new kind of federalism".[92] The whole development of military hardware represents "functions that the United States Government has decentralised and delegated mostly to the private sector of society".[93] The alternative available would have been for "government to accrue these functions to itself and thereby augment an already monolithic bureaucracy".[94] However, the dispersal of these functions creates a problem for the DoD. As former Deputy Assistant

Secretary of Defense Jacques Gansler stated, "although DoD is virtually the sole buyer at the prime contractor level, and its prime contractors are oligopolies extensively using government plants, equipment and money, DoD has essentially no policies or organisations dedicated to planning for the most effective use of its industrial resources".95]

As stated earlier, and to be discussed, contractors work closely with their DoD Components especially in the earlier stages of a weapon systems development. "Contractors perform research and development to maintain their competitive position by coming up with new products for the Services".96] Once a Service has chosen a given system, and the contractor, it is also in the Service's best interest to prepare strategies and scenarios to enhance their chances of funding from Congress. Proof of this comes from perhaps their worst attempt, which was made public in a letter from Representative Jack Brooks. As Chairman of the Committee on Government Operations, Representative Brooks wrote a letter to the Comptroller General, of the General Accounting Office, on 26 July 1982, which read, "it appears that DoD has developed comprehensive files on Members to further aid their lobbying efforts and possibly other illegal and unethical activities".97] Thus, it appears that the DoD Components, as well as, the contractors are in the business of promoting their weapon system. However, to appreciate more fully the development of a weapon system, the discussion is directed to the other parallel decision process - The Life Cycle.

N O T E S

1. ALEXANDER, A, "Weapons Acquisition in the Soviet Union, United States and France", The RAND Corporation, March 1973, p.49.

2. HAMMOND, P, "Super Carriers and B-36 Bombers : Appropriations, Strategy and Politics in American Civil Military Decisions", University of Alabama Press, Birmingham, 1963.

3. ART, R, "The TFX Decision : McNamara and the Military", Little Brown & Co., Boston, 1968.

4. HEAD, R, "Decision-making on the A-7 Attack Aircraft Program", PH.D. Thesis, Syracuse University, New York, 1971, partially contained in, "The A-7 Decisions : A Case Study of Weapons Procurement", American Defense Policy, Johns Hopkins Press, Maryland, 5th Edition, 1982.

5. HALPERIN, M, "The Decision to Deploy the ABM : Bureaucratic and Democratic Politics in the Johnson Administration", World Politics, 25 October 1972.

6. PPBS - as called for in DoD Instruction 7045.7, dated 29 October 1969. This document "... established procedural guidance for ... submission, analysis, review and approval of ... Department of Defense ... budgets".

7. ENKE, S, "Defense Management", Prentice-Hall Inc., New Jersey, 1967, p.352.

8. Joint Chiefs of Staff Memorandum of Policy, (MOP-84), Office of the Joint Chiefs of Staff, Washington DC, 1984.

9. According to Joint Chiefs of Staff Memorandum of Policy (MOP-84) hereinafter referred to as JCS-MOP-84, the Joint Intelligence Estimate for Planning (JIEP), includes : a global appraisal with an estimate of the world situation and the nature of the military threat; regional appraisal including estimates of the external and internal threats to countries of significance to the USA.

10. The Intelligence Priorities for Strategic Planning (IPSP) provides guidance for the tasking of DoD intelligence production, collection and support activities. It establishes comprehensive military intelligence requirements categories and priorities (JCS-MOP-84).

11. The Joint Security Assistance Memorandum (JSAM) contains assessments based on an analysis of the military interests of the USA such as, security assistance objectives; desired force levels of friendly and allied nations; foreign military sales cash, commercial and other types of procurement. (JCS-MOP-84).

12. The Joint Strategic Capabilities Plan (JSCP) provides the military strategic concept to support the national security objectives and the military objectives derived from these. This concept is based on projected available forces, the Joint Intelligence Estimate for Planning (JIEP) and other applicable intelligence and subsequent guidance issued by the SECDEF. It provides guidance on forces, logistics, intelligence and the development of plans and assigns tasks to the Commanders of Unified and Specified Commands. (JCS-MOP-84).

13. Joint Long-Range Strategic Appraisal (JLRSA) provides a basis for transition from long-range to mid-range strategic planning. It is intended to stimulate more sharply focused strategic studies, to provide a general framework for outlining such broad force structuring implications as may be identified, and to develop and assess military policies, plans and programmes having both mid- and long-range implications. (JCS-MOP-84).

14. Joint Strategic Planning Document (JSPD) contains a concise, comprehensive military appraisal of the threat to US interests and objectives worldwide. It is a statement of the recommended military objectives derived from national objectives; and the recommended military strategy to attain national objectives. A summary of the Joint Chiefs of Staff (JCS) planning force levels which could successfully execute the approved national military strategy is included, as well as views on the attainability of these forces in consideration of fiscal responsibility, manpower resources, material availability, technology and industrial capacity. This document also provides an appraisal of the capabilities and risks associated with programmed force levels, based on the planning forces considered necessary to execute the strategy, and recommends changes to the force planning and programming guidance where appropriate. (JCS-MOP-84).

15. For a discussion of the Planning, Programming and Budgeting System (PPBS), <u>See</u>, pp. 110-113

16. For a discussion of the Defense Guidance (DG) <u>See</u>, pp. 114-125

17. Joint Program Assessment Memorandum (JPAM) provides a risk assessment, based on the composite of the Services' force recommendations (found in the Services' Program ObjectivesMemoranda (POM)) and includes the views of the Joint Chiefs of Staff on the balance and capabilities of the overall forces and support levels to execute the approved national military strategy. Where appropriate, the Joint Chiefs of Staff recommend actions to achieve improvements in overall defence capabilities within the alternative funding levels directed by the Secretary of Defense (SECDEF). (JCS-MOP-84).

18. For a discussion of the Program Objectives Memorandum (POM), <u>See</u>, pp.125-130

19. For a discussion of the Program Decision Memorandum (PDM), <u>See</u>, pp.130-139

20. HITCH, C, "<u>Planning-Programming-Budgeting System</u>", American Defense Policy, Johns Hopkins Press, Maryland, 1966, p.212.

21. Defense Reorganisation Act of 1958.

22. Although the yearly dates are in the past (for the F-16) the description that follows is explained in the present setting. This is intentional because the focus here is to look at the organisational functions as they operate. The dates assigned are to assist the reader through the 26 months of the cycle.

23. COOPER, B, "<u>Fighter Aircraft Program, F-16,</u> Congressional Research Service, Washington DC, 21 January 1983, p.2.

24. The Defense Guidance as prepared by the Office of the Under Secretary of Defense, Policy, under the direction of the Defense Resources Board (DRB) and approved by the SECDEF consists of the following :

    Threat Assessment and Opportunities : a brief appraisal of the world environments, threats to interests of the USA, vulnerabilities and opportunities.

Policy Guidance : Goals, objectives and policies to guide all defence planning.

Strategy Guidance : Peacetime crises and wartime strategies to guide planning for force development.

Force Planning Guidance : A force table depicting the major force structure expected for support of the policy, strategy and force planning guidance and is included in the first and last year of the upcoming Five Year Defense Plan (FYDP).

Resource Planning Guidance : Planning criteria, assumptions and priorities for the commitment of defence resources.

Tentative Fiscal Guidance : Projections of total authority for DoD Components to plan for the upcoming Five Year Defense Plan (FYDP) period plus the ten year extended planning period.

Major Issues : Statements of problems, especially those related to strategy-capabilities mismatch, which require further study or top management attention.

Source: Memorandum dated 5 June 1981 "The Planning Phase of the DoD PPB System", from Under Secretary of Defense Policy, re: Defense Guidance, Department of Defense, Washington DC.

25. The Defense Resources Board (DRB) is chaired by the Deputy Secretary of Defense, whose purpose is to assist the SECDEF in managing the planning, programming and budgeting process. The membership of the DRB is as follows :

Chairman	:-	Deputy Secretary of Defense
Executive Secretary	:-	Executive Assistant to the Deputy Secretary of Defense
Permanent Members	:-	Chairman of the JCS Secretary of the Army Secretary of the Navy Secretary of the Air Force Under Secretary of Defense, Policy Under Secretary of Defense, Research and Engineering Assistant Secretary of Defense, Comptroller Assistant Secretary of Defense, Health Affairs Assistant Secretary of Defense, International Security Affairs

Assistant Secretary of Defense,
International Security Policy
Assistant Secretary of Defense,
Manpower, Reserve Affairs
and Logistics
Director, Program Analysis and
Evaluation
Associate Director, Office of
Management and Budget

Source: Memorandum from Deputy Secretary of Defense re: "Defense Resources Board", Department of Defense, Washington DC, 27 March 1981.

26. Interview with a military source who wishes not to be identified.

27. JONES, David C, "Why the Joint Chiefs of Staff Must Change", Report to the Chairman, Joint Chiefs of Staff, April 1982, p.5.

28. Sunday Times Review, London Times, 27 April 1986, "The Triumph of Politics : How the Reagan Revolution Failed", Harper and Row, New York, 1986.

29. Memoranda prepared by the Deputy Secretary of Defense, "Management of the DoD Planning, Programming and Budgeting System", 12 June 1981, p.4.

30. The source of the sequence of events are contained in the Planning, Programming and Budgeting System, A Primer, Department of the Air Force, Directorate of Programs and Evaluation, Washington DC, November 1981, pp.1-41.

31. JANIS, I, "Victims of Groupthink", Houghton Mifflin & Co., Boston 1972, p.37.

32. The reader will notice that the discussion has jumped from January to May (a period of 4-5 months). This is intentional because the most important work has been ongoing within the DoD Components (Army, Air Force, Navy) each, as mentioned before, pursuing through their own acquisition structure, a final document known as the Program Objectives Memorandum (POM).

33. For a discussion of the Five Year Defense Plan (FYDP), See, pp. 144-146.

34. Source: Department of Defense Instruction (DODI) 7045.7, "The Planning, Programming and Budgeting System", Department of Defense, Washington DC, 29 October 1969.

35. Army Regulation ARI-1, The Army Planning System.

36. Source: Department of Defense Instruction (DODI) 7045.7, "The Planning, Programming and Budgeting System", Department of Defense, Washington DC, 29 October 1969.

37. The Director, Program Analysis and Evaluation plays two prominent roles in the DRB, related to "fiscal guidance and cost effective force trade-offs, cross-Service balance and mutual support. Secondly, he assists in ensuring that programs and policies are consistent". See, Deputy SECDEF Memoranda on "Management of the DoD ...", op.cit., p.5.

38. COLLINS, John, "US Defense Planning : A Critique", Westview Press, Boulder, Colorado, 1982, p.70.

39. The Program Budget Decisions (PBDs) address specific budgetary issues and are related to the appropriations and budget activity structure of the Department of Defense. The PBDs include not only the information of the current year but also that of prior years if appropriate, and also include an estimate of the impact of the PBDs on the next programme year.

    Source: Department of Defense Instruction (DODI) 7045.7, "The Planning, Programming and Budgeting System", Department of Defense, Washington DC, 29 October 1969.

40. Deputy SECDEF Memoranda on "Management of the DoD ...", op.cit., p.4.

41. Interview with Bert Cooper, Specialist in Aircraft Procurement, Foreign Affairs and National Defense Division, Congressional Research Service, Washington DC, November 1982 to April 1983.

42. Ibid.

43. Authorisations, Congressional permission to establish or maintain a government programme or agency by defining its scope and sometimes limiting how much Congress may appropriate in specific cases. Authorising legislation normally is a prerequisite for appropriations, but does not make money available by itself.

44. Appropriations, One form of Congressional legislative authority is to fund a department, agency, or programme for a particular period (usually a fiscal year). Such money must be spent for purposes specifically designated by Congress, but not necessarily during the year it is made available.

45. Oversight, "Congress does not participate directly in defense concept formulation. It does, however, help shape strategy as part of the oversight process, which scrutinises every facet while keeping fingers on the public pulse to get a feel for wants and needs of the nation's people." See, COLLINS, J,"US Defense Planning : A Critique", Westview Press, Boulder, Colorado, 1982, p.21.

46. KRONENBERG, P, "Planning US Security, Defense Policy in the Eighties", Pergammon Press, New York, 1982, p.189.

47. ASPIN, L, "The Defense Budget and Foreign Policy The Role of Congress", American Defense Policy, 4th Edition, Johns Hopkins Press, Maryland, 1977, p.321.

48. Idem.

49. Idem.

50. Idem.

51. Enactment Authorisation Process - The Authorisation Process begins the Congressional action on the annual DoD budget. For the Fiscal Year (FY) 1975, this begins in January 1974 and should be completed by June 1974.

IV-1 In mid-January, the President submits the DoD budget to the Congress. Detailed review commences early in February as the House Armed Services Committee begins final hearings at which various members of the Defense Establishment testify with regard to the Budget and its content.

IV-2 When the House Armed Services Committee Hearings are complete, the Committee "marks up" (amends) the Budget as submitted and prepares and issues its Authorisation Bill Report, which contains the committee's recommendations on changes.

IV-3 The Bill and the House Armed Services Committee Report are submitted to the full House for floor debate, further amendments and passage of a House version of the Authorisation Bill.

IV-4 The Senate Armed Services Committee also holds a series of hearings (some in parallel with the House Armed Services Committee). The Senate Armed Services Committee also prepares and issues a Report on the Authorisation Bill. After review by the full Senate, floor debate, amendments, the Senate passes its version of the Authorisation Bill.

IV-5 If there are any differences between the two versions of the Bill - and there usually are - they are resolved by a Conference Committee (committee comprised of House and Senate members). After resolving the differences, the Conference Committee prepares and issues a Conference Report with its recommendations as to how to resolve the differences.

IV-6 The Conference Report is brought to the full House for review, floor debate, and passage of an amended Authorisation Bill. (Any amendments to the Bill, other than those recommended by the Conference Report could result in the necessity for a second Conference Committee being formed).

IV-7 The Senate next takes up the Conference Report and the House passed Authorisation Bill. After debate, the Senate also passes the Authorisation Bill.

IV-8 The Authorisation Bill is then forwarded to the President for signature to become an enacted law.

Source: "<u>Understanding Congress : A Seminar on the Legislative Process</u>", Washington Monitor Inc., 14 March 1979, pp.III-1 to III-21.

52. The Appropriation is very much similar to the Authorisation Process in that the Bill must be considered by the committees of both houses, in this case the Appropriations Committees (and their Defense Sub-Committees) pass both Houses, be compromised in conference, and finally passed and then signed by the President (See, footnote 51). The major logistical difference here though is that the Defense Sub-Committee of the House and Senate Appropriations Committee also "marks up" its own version and issues its own Sub-Committee Report to the full Committee. An obvious point, but of great impact, is that any item which should be deleted during the Authorisation Bill review and passage, cannot be considered during the Appropriation Bill review and passage. For the Fiscal Year (FY) 1975, this phase begins in February 1974 and should be complete by September 1974.

    Source: "Understanding Congress, A Seminar on the Legislative Process", Washington Monitor Inc., 14 March 1979, pp.III-14, III-20.

53. ORNSTEIN, N, "America in the Seventies : Problems, Policies, and Politics", Little Brown & Co., Boston, 1977, p.2-3.

54. Source for the sequence of events: "Planning, Programming and Budgeting System", op.cit., pp.1-41.

55. The recoupment objective is the amount by which the funding of budget year programmes is reduced in anticipation of such recovery. See, "Analysis of DoD's Claimed Budgetary Savings through Management Reforms", GAO Report, Washington DC, 4 April 1983, Appendix II, p.8.

56. The Military Departments are authorised to incur certain obligations for clothing, transportation, supplies etc. and under certain circumstances require immediate action that cannot be delayed to the non-availability of funds. See, "Budgetary Savings through Management Reforms", GAO Report, op.cit., Appendix II, p.10.

57. "General Dynamics F-16 A/B Fighting Falcon", DMS Market Intelligence Report, DMS Inc., 1980, p.8.

58. "Pentagon Acquisition of Arms Slated for Iran Requested by Carter", Washington Post, 28 February 1979, p.A-5.

59. Services may recommend reprogramming to solve financial shortfalls or to adjust programmes. See, "Budgetary Savings through Management Reforms", GAO Report, op.cit., Appendix II, p.11.

60. In Fiscal Year 1983, the total Research, Development, Test and Evaluation (RDT&E) funds were in millions :

    Total: $24,256.6
    Air Force: $11,220.4 (or 46.3% of the budget, the largest recipient)
    Emergency R&D: $890 million

    Source: The FY 1983 Department of Defense Program for Research, Development and Acquisition, prepared by Under Secretary of Defense, Research and Engineering, for the 97th Congress, 2 March 1982, p.A-2.

61. GENTRY, J (Lt.Col. USAF), "Evolution of the F-16 Multinational Fighter", Unclassified, Industrial College of the Armed Forces, 1976, p.53.

62. Mr David Packard is a founding member and namesake of a company co-founded in the 1950s by Mr Hewlett, known as Hewlett-Packard, which is involved in making computers and advanced scientific instruments, radar devices, and other sophisticated equipment for US defence programmes. One of the company's plants is situated on Route 128 in Massachusetts (and also in New Hampshire) because of its proximity to the Massachusetts Institute of Technology (MIT), and sits nestled between others such as IBM, Marconi and Plessey and General Electric.

63. Ten programmes comprise the Five Year Defense Plan (FYDP) structure used to display approved programmes, and as evidenced by the following titles, identify broad areas of both mission and support :

    Programme 1 - Strategic Forces
    Programme 2 - General Purpose Forces
    Programme 3 - Intelligence and Communications
    Programme 4 - Airlift and Sealift
    Programme 5 - General and Reserve Forces
    Programme 6 -*Research and Development
    Programme 7 - Central Supply and Maintenance

Programme 8 - Training, Medical and Other General Personnel Activities
Programme 9 - Administrative and Associated Activities
Programme 10 - Support of Other Nations

Reference: The Air Force Budget 1973. (*Research and Development (R&D) consists of all R&D activities which are not related to items approved for procurement and deployment. The R&D costs related to operational systems will appear in appropriate elements in programmes to which the weapon or support system may be identified.)

64. "Underestimation of Funding Requirements in Five Year Procurement Plans", GAO Report, Washington DC, 12 March 1984. The Report analysed the planned weapon systems cost versus the actual Total Obligational Authority (TOA) provided for 97 major weapon systems from 1963 to 1983 and found that Congress must consistently provide greater appropriations than anticipated - an average 32 percent more! p.21.

65. *Ibid*. p.22.

66. Report of the Acquisition Cycle Task Force, Defense Science Board, Office of the Under Secretary of Defense for Research and Engineering, Washington DC, March 1978, p.26.

67. "Military Procurement: Still an Unsolved Problem", The Defense Monitor, Centre for Defense Information, Washington DC, Vol.V, No.8, October 1976, p.1.

68. "SARs - Defense Department Reports that Should Provide More Information To The Congress", GAO Report, Washington DC, 9 May 1980.

69. *Ibid*. p.14.

70. David Packard, Deputy Secretary of Defense, address to the Armed Forces Management Association, August 1970.

71. Under the "cost-plus-fixed-fee" contract, the firm was guaranteed a fixed fee, or profit, no matter how high the total cost of the system; the government bore all the costs incurred by the contractor in developing and producing the weapon system.

72. MARSHALL, A W, and MECKLING, W H, "Predictability of the Costs, Time and Success of Developments", p.1821, December 1959, as printed in, ACT, R, "Why We Overspend Underaccomplish", Foreign Policy, No.6, Spring 1972, p.97; and PECK, M , and SCHERER, F, "The Weapons Acquisition Process : an Economic Analysis", Boston, Harvard Business School, 1962.

73. Secretary McNamara assembled an unusually sophisticated team: As his Deputy Secretary he chose Roswell Gilpatrick, a former Air Force Under Secretary, who himself had been considered by President Kennedy for appointment as Defense Secretary. Among his Assistant Secretaries were Paul H Nitze, as head of International Security Affairs ("known as the Pentagon's little State Department"), who was a widely respected expert on strategy and foreign policy with extensive State Department experience. Charles J Hitch (Hitch and McKean) as Comptroller, who was a leading economist, and member of the RAND Corporation. Harold Brown, as Director of Research and Engineering, a physicist from Livermore Laboratory of the University of California. "Each of these deputies assembled his own team of specialists in strategy and foreign policy." See, RANSON, H, "Department of Defense : Unity or Confederation", American Defense Policy, 2nd Edition 1968, p.372. Also, "perhaps the most important and enduring change was in the structure of the Pentagon and in the decision making processes. Mr McNamara relied more on his civilian advisers than on the armed services ...". See, HALPERIN, M, "Evolution of American Military Strategy", American Defense Policy, 2nd Edition 1968, p.181.

74. Contract definition "employed the techniques of system analysis and cost effectiveness analysis", which led to the introduction of "program budgeting, that is, organising the budget around functions". See, HALPERIN, M, "Evolution of American Military Strategy", op.cit., p.181.

75. ACT, R, "Why we Overspend and Underaccomplish", Foreign Policy, No.6, Spring 1972, p.98.

76. FISHER, I N, "A Reappraisal of Incentive Contracting Experience", RAND Corporation, RM-5700-PR, July 1968.

77. Idem.

78. "Acquiring Weapon Systems in a Period of Rising Expenditure : Implications for Defense Management", GAO Report, Washington DC, 14 May 1981, pp.6-7.

79. Deputy Secretary of Defense David S Packard, "Cost Growth Definitions", Office of the Deputy Secretary of Defense Memorandum dated 5 August 1970.

80. "Acquisition of Major Weapon Systems", GAO Report, Washington DC, 18 March 1971, p.61.

81. US Congress, Joint Economic Committee, "The Acquisition of Weapon Systems", Hearings, 92nd Cong., 1st Sess., Washington DC, 21 May 1970, Part II, pp.440-46.

82. MORLANDER, E, "Cost Overruns : The Defense Industry View", Perspectives in Defense Management, No.24, Winter 1975-76, pp.98-99.

83. Ibid. p.101.

84. "Military Procurement : Still an Unresolved Problem", The Defense Monitor, Centre for Defense Information, Washington DC, Vol.V, No.8, October 1976, pp.2-3.

85. Ibid. p.2.

86. Ibid. p.2.

87. Letter from Director, GAO Affairs, to Secretary of Defense Caspar Weinberger, re: Reporting Competition in Defense Procurements - Percent Changes are Misleading, 8 March 1982, p.1.

88. Idem.

89. Idem

90. Interview with Bert Cooper, Specialist in Aircraft Procurement, Foreign Affairs and National Defense Division, Congressional Research Service, Washington DC, November 1982 to April 1983.

91. GANSLER, J, (former Deputy Assistant Secretary of Defense), "Let's Change the Way the Pentagon Does Business", Harvard Business Review, Vol.35, May-June 1977, p.110.

92. POSVAR, W, "Dispersion of the Strategy-Making Establishment", Viking Press, New York, 1969, p.11.

93. Ibid. pp.340-41.

94. Ibid. p.341.

95. GANSLER, J, "Let's Change the Way the Pentagon Does Business", Harvard Business Review, Vol.35, May-June 1977, p.110. As Deputy Assistant Secretary of Defense in the US Department of Defense, Jacques S Gansler was responsible for defence material acquisitions. Formerly he was with the International Telephone and Telegraph Corporation as Vice-President and Director of Business Development in the Avionics Division. Before that he was an executive in both the Singer Company and the Raytheon Corporation. Source: Notes about the author, Harvard Business Review.

96. "Summaries of Conclusions and Recommendations on Department of Defense Operations", GAO Report, Washington DC, 26 January 1970, p.24.

97. Letter from Chairman of the Committee on Government Operations (House of Representatives), Honorable Jack Brook, to the Comptroller General of the General Accounting Office, Charles Bowsher, 26 July 1982, as printed in, "Compiling Numerical Ratings for Members of the Congress by the Department of Defense", GAO Report, Washington DC, 20 June 1983, Appendix I.

CHAPTER 4

THE LIFE CYCLE AND THE DECISIONAL PROCESSES

Life Cycle

The development of major weapon systems is a primary function of the Department of Defense. The development process is as highly structured and complex as that witnessed in the Fiscal Cycle. The combined process involves close interaction between the needs of the users, the military, and the ability of the developer, the weapons contractors, to fulfil them. A substantial portion of personnel of the Office of the Secretary of Defense (OSD) and the military services are involved in the process, in which the costs of weapons development consume a large portion of the military budget each year, and involves large segments of industry which are engaged in producing them.

In the previous Chapter it was stated that the process of weapons acquisition should be broken into four phases :

1. Concept Exploration (Conception)
2. Demonstration and Validation (Research and Development
3. Full-Scale Development
4. Production and Deployment.[1]

These are the same four phases of a weapons system's Life Cycle, however there are Department of Defense Directives, DoD "Circulars" and Milestone decisions which accompany these phases. Before continuing to the intricacies of the documentation and milestones that must be surpassed in any weapon system's life a few words must be devoted to the four phases.

Conceptual Phase

Simply, this is the initial phase in weapons acquisition. In this phase, the need for new military capabilities is established, concepts are developed for a weapon system which will provide those capabilities, and technical feasibility is explored and determined. The objective of this phase is to provide the technical, economic and military basis for initiating full-scale development of the weapon system. Advancement to the next phase, Demonstration and Validation, is dependent on satisfying criteria designed to measure achievement of the conceptual phase's objective. According to the Comptroller General of the US, there are six objectives to be accomplished in this phase :

- Mission and performance must be defined.

- A thorough trade-off analysis must be made among the elements of cost, schedule, and performance to ensure that the most effective product is obtained when it is needed and at the most reasonable cost.

- A Military Service must ensure that the best technical approaches have been selected for the new weapon system.

- The Service must provide assurances that engineering rather than experimental effort remains uppermost in the program and that the needed technology is available.

- The cost effectiveness of the proposed weapon must have been determined to be favourable in relation to the cost effectiveness of competing systems on a DoD-wide basis.

- The Service must ensure that the cost and schedule estimates are both credible and acceptable.[2]

Demonstration and Validation Phase

In this phase, the preliminary designs and engineering for the weapon system are verified or accomplished; management plans are made; proposals for engineering development are solicited and evaluated; and (most important) a development contractors selected. The objective of this phase is to verify that the technical and economic bases for initiating full-scale development of the weapon system are valid. Advancement to the next phase, Full-Scale Development, depends upon the establishment of achievable performance specifications for the weapon system that are supported by an acceptable proposal for the selected development contractor.

Full-Scale Development

In this phase, the design and engineering of the weapon system is accomplished - the development contract is negotiated and awarded; the prototype of the weapon system is developed, purchased, and tested; and the detailed specifications for manufacturing the weapon system are prepared. The objective of this phase is to develop a weapon system acceptable for production.

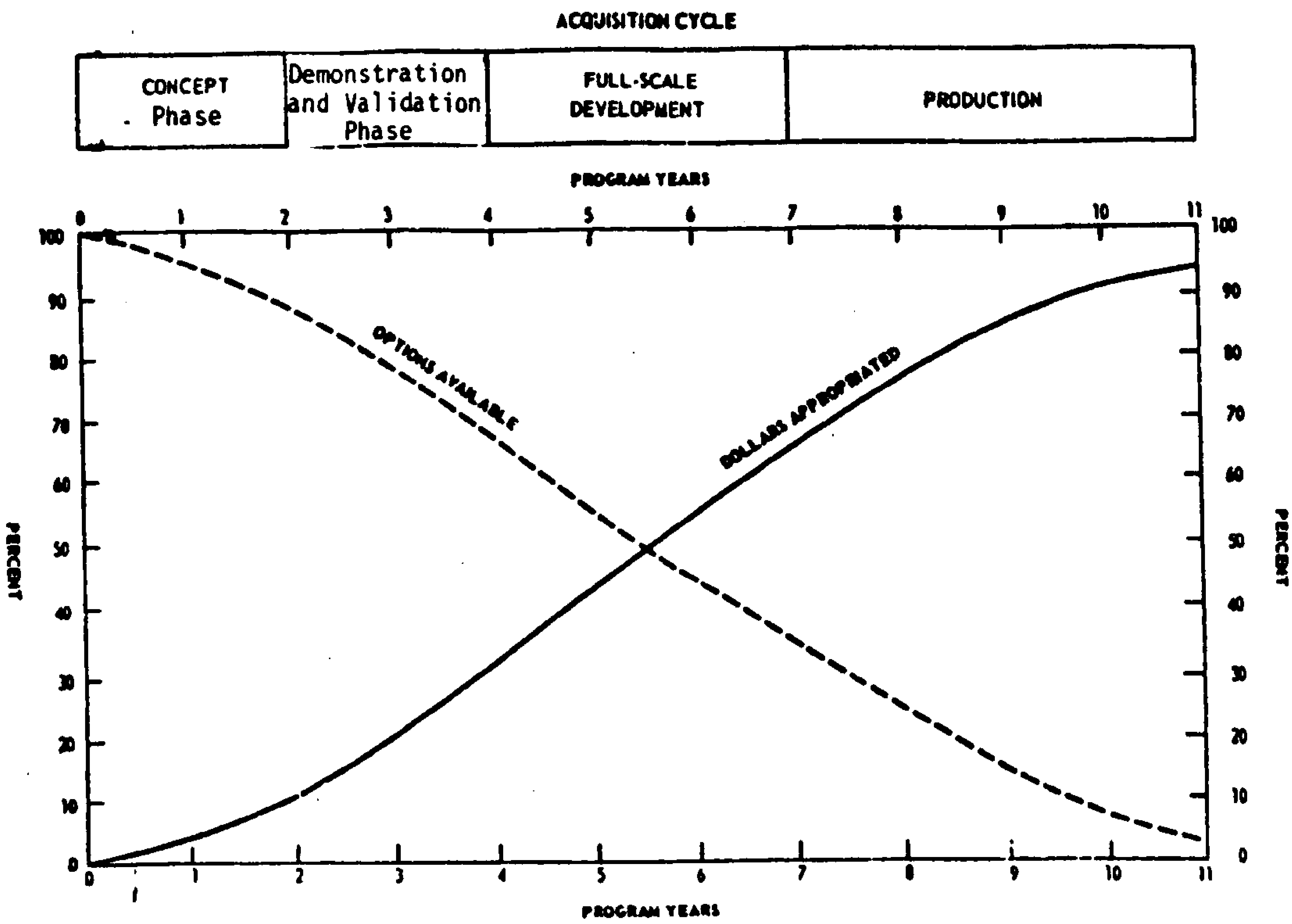
Production and Deployment

The weapon system is produced in quantity for deployment. It begins when the production contract is negotiated and awarded. Production acceptance tests are conducted to validate the adequacy of the production model of the weapon system. Quantity production is initiated and the first operational unit is equipped with the weapon system and trained to use it. Production continues until all required quantities of the weapon system are produced.[3]

There are many potential weapon systems that never progress beyond the early stages of consideration. Some reasons for this are the unavailability of the necessary technology; the realisation that a potential system may become too costly for its intended purpose; the anticipated obsolescence in terms of the threat that the system is intended to counter; or another system concept subsequently may compete more effectively. The importance of the previous few pages is two-fold. First, before advancing from one phase to the next, approval must be received from the Office of the Secretary of Defense. Whether or not the SECDEF is a party to every decision in the proceedings will be a central focus of this section. The suggestion herein is that he is not involved to a great extent. The second focus deals with the commitment of the government. By the time the system reaches full-scale development, the government's commitment has become so great, and the structure of the programme so definite, that major adjustments to the programme are difficult because they almost always delay critical delivery dates and prove to be costly. Few really acceptable options are available to the government once the design is approved and a decision made to begin production. The pattern of deeper involvement and decreasing options is best demonstrated in Figure 4-I.

Figure 4-I

Options Available During Acquisition Cycle



41]

Obviously, the greatest opportunity for broad decisions occurs during the earlier stages of production. Moreover, the further a programme has progressed the harder it is, for example, for Congress to discontinue it. Just how the Department of Defense and the Military Services travel down the continuum of these phases will now be the focus.

The Department of Defense works with documents and forms referred to as Department of Defense Directives (since 1976 DoD also uses OMB Circular A-109, See, Appendix 2). The decisions made throughout the acquisition process are designated as Milestones (or milestone decisions). The documentation and decisions follow their own numbering system and should not be confused with following the pattern of the four phases listed above. For example, DoD 5000.1 does not refer to the Conception Phase, nor does Milestone I (this actually refers to the Demonstration and Validation Phase).

Primarily, the Life Cycle of any defense system is controlled by the four Department of Defense Directives (DoDD) or Department of Defense Instructions (DoDI) listed below :

DoDD 5000.1

"Major Systems Acquisition" (See, Appendix 1). Its purpose is to establish acquisition policy for major systems within the Department of Defense which apply to the Office of the Secretary of Defense (OSD), and the Military Departments and the Defense Agencies (designated as DoD Components). This document is noted for its establishment of the major milestones and phases for acquisition programmes, and the documentation required for major systems :

(JMSNS) - Justification of Major System New Start
(SCP) - System Concept Paper
(MENS) - Mission Element Need Statement
(DCP) - Decision Co-ordinating Paper (previously referred to as Developmental Concept Paper - See, footnote 34 of Chapter 5)
(IPS) - Integrated Program Summary
* (SDDM) - Secretary of Defense Decision Memorandum

(* More will be discussed on the content of these papers later in this Chapter and in Chapters 5, 6, 7 but presently, the exercise is to demonstrate the requirements of DoDD 5000.1)

It also advances the responsibilities for systems acquisition within the Office of the Secretary of Defense, and the specific individuals and groups involved, which are :

(DAE) - Defense Acquisition Executive [5]
(DSARC) - Defense Systems Acquisition Review Council [6]

Every defence system is restrained by these documents and, as will be demonstrated, these documents listed above are primarily produced by various DoD Components. Also, although DoDD 5000.1 is titled "Major Systems Acquisition", at the bottom of the document it is stated that, "The management principles and objectives in this Directive should also be applied, where appropriate, to the acquisition of systems not designated as major".[7]

DoDI 5000.2

"Major System Acquisition Procedures", whose purpose is to provide the procedures for the implementation of the above DoDD 5000.1. It merely instructs or complements the above Directive.

DoDD 5000.3

"Test and Evaluation" phase which establishes policy for the conduct of test and evaluation by the DoD Components in the acquisition of weapon systems. In addition, it defines the responsibilities of the Director, Defense, Test and Evaluation (DDT&E) now the Under Secretary of Defense, Research and Engineering (DDR&E). "The Director of Defense, Research and Engineering, was by statute designated the Defense Secretary's principal adviser on scientific and technical matters".[8] He supervises "all research and engineering in the Department of Defense and to control, assign or reassign any research and engineering activities".[9] More importantly though, the Director also now referred to as Under Secretary of Defense for Research and Engineering, is designated as the Defense Acquisition Executive for the Defense Systems Acquisition Review Council (DSARC). Thus his dual role is comprised of supervising research and engineering activities, but, essentially all of the activities are related to the development of weapons.

DoDD 5000.4

"Office of the Secretary of Defense (OSD) Cost Analysis Improvement Group (CAIG)" whose purpose is to provide a permanent charter or guidelines for themselves, namely the OSD CAIG.[10]

OMB-A-109 Circular

Since 1976, another important document known as the Office of Management and Budget Circular A-109, has been included. The purpose of the A-109 is to "identify technical risks, adequacy of testing, affordability, program concurrency, cost effectiveness, program management, deployment strategy and timeliness".[11]
(Also, see, Appendix 2 and Footnote [12]

Aside from the Department of Defense Directives, the other reference to decisions adopted within the DoD are the Milestone decisions - Milestones 0, I, II and III. Prior to reaching the point of making a Milestone I decision, a Mission Need Determination Decision must be exercised. The link between the Milestone Decisions in conjunction with the four phases mentioned earlier, take on the following association and order :

I. Concept Exploration - Mission Need Determination Decision - Milestone 0

II. Demonstration and Validation - Milestone I

III. Full Scale Development - Milestone II

IV. Production and Deployment - Milestone III.

It is appropriate to note here that the Life Cycle follows stages along a continuum as does the Fiscal Cycle. Unlike the Fiscal Cycle, the Life Cycle does not have a specific scheduled time frame of development to which to adhere. Consequently, no dates will be assigned to these stages.

I. Mission Need Determination Decision - Concept Exploration

This is the most difficult phase for any weapon system. The justification for selecting a particular major weapon system must meet key considerations such as mission requirements, threat studies, current capabilities, and technological advances. The notion that Concept Exploration follows a policy guidance starting in the Oval Office and filtering down was likened by General Maxwell Taylor[13], to "the British Constitution in that it is never set down in a single document ...".[14] Nor is it a group within the DoD following a structural annual pattern of decision making to answer the above considerations for new systems - it is an ongoing process. The DoD Components conduct continuing analyses of their mission areas to identify deficiencies in their capabilities or to identify more effective means of performing their designated tasks. First and foremost, it is an indicator that the needs for a new system are determined by the DoD Components and not by those at the top. For example, as evidenced in the previous two Chapters, the assessments of requirements, needs, <u>et</u> <u>al</u> formulated by the JCS, are prepared by the DoD Components. Other than those documents[15] the JCS are "not very valuable as far as the process is concerned ...".[16] Second, in conducting such analyses, especially those involving new technologies, the DoD Components weigh heavily on outside assistance, especially from private contractors. Third, and obvious, it is these reviews and analyses which will result in a decision to initiate a new system. In the past (pre OMB-A-109 Circular 1976), "the real starting point of a program was rarely a discrete bureaucratic milestone, nor a formally documented mission need, but rather some form of general consensus about how to join an operational need, with available or emerging technology, that arose spontaneously from the grass roots of the military establishment and the defense industrial base".[17] The exact time when this "consensus occurred is difficult to identify and is seldom documented".[18] However, the suggestion is that the DoD Components have a greater amount of influence in this phase than their superiors. This will be further detailed in the case of the F-16, where the "Fighter Mafia" exerted influence to the higher echelons. Moreover, in the next phase, Demonstration and Validation, it is the DoD Components working with contractors and research scientists in the application of matching new technologies with operations. The assumption, for now, is that they are also working with them during the Concept Exploration phase - this will be substantiated during the F-X and F-XX studies of the F-16.

The actual decision to initiate a programme was best described by Richard Head[19] when he said, "the reasons for [the initiation of the A-7 Attack Aircraft programme] are many, but among them is an unusual relationship of personalities - Russell Murray in Systems Analysis and George Spangenberg in the Bureau of Naval Weapons".[20] The Navy's decision "to award the A-7 contract to LTV was primarily on the basis of Spangenberg's analysis of the competing design".[21] Although this is also true of the F-16 programme with the personalities of the "Fighter Mafia" exerting influence, the point is, that the actual decision to initiate a programme is unique to that programme. Moreover, it stresses the point that certain individuals are responsible for a given programme. This suggests that any programme, given the levels of expertise which are required in new technologies is initiated from below. For example, new technological advances will come from scientists or analytical experts from within DoD, or from weapons contractors assisting DoD Components. Thus a review of the earlier activities of the relevant contractors will illuminate the decision to initiate new technologies.

Further proof of the uniqueness to initiate a programme was also provided, again by Richard Head, by stating that, "there was a certain congruence - a co-ordination of expectations - between Navy attack advocates and Systems Analysis on the desirable characteristics of a new aircraft".[22] What must be realised is at the same time of the A-7 programme, the "OSD decision to award the F-111 contract to General Dynamics was in the policy process for over thirteen months; the award of the A-7 contract to LTV [Ling-Temco-Vought] took less than three weeks!"[23] Hardly enough time for the ink to be dry on the documents discussed below, but of more significance would be the fact that many decisions had been made prior to OSD involvement. A discussion of the documents and their procedures will follow after a discussion regarding the initiation of new weapon systems and the relevant technology.

The military services or DoD Components "are responsible for initiating and managing the thousands of R&D projects that make up the total R&D programme."[24] For example, a "major Air Force weapon system program has its start in the continuing mission area and new technology studies that are conducted by HQ USAF [Headquarters, United States Air Force] and the major commands. These ongoing studies involve making trade-offs among stated missions, concepts of operations and available or projected technology and become the basis for more detailed definition of operational capabilities for the future force structure".[25] Formal DoD procedures call for approval of a statement of military requirement before a project enters exploratory development. However, the military requirement, "as tempered by the knowledge of what is technologically feasible, links the military user to the developer in the R&D community".[26] Sometimes the requirement "may originate in the demonstration of a new technological capability, but formally it will come from the operational command".[27] Also, the military requirements reflect the missions of each service, and new weapons originating in the services perpetuates existing missions. For example, "the cancellation of the B-1 bomber, was followed immediately by the formation of an Air Force task force to draw up requirements for a future manned penetrating bomber".[28] On the other hand, new technological developments from an existing major system, do not usually take on the role of prompting a new military requirement. The bias of contractors is to follow new developments to well established missions - gold plating - because "these systems will already enjoy broad support within the Service and the Office of the Secretary of Defense".[29] Regardless of whether a system was initiated from a "spin off" of new technologies, or fulfilling a Service's requirement, the DoD Components exhibit a greater involvement in conception of new systems than their superiors. Consider the following procedures :

Although the DoD Components are responsible for initiating and managing the R&D programmes, and preparing the statements of the military requirements, research in industry has begun to go beyond technical subjects. For example, General Electric publishes a Defense Quarterly that is devoted to the broader issues of technology and foreign and military policy. "It has also established a 'think' group of its own, as have other corporations such as General Dynamics, IBM, and many of the large aircraft companies".[30] While many of these in house divisions are set up for scientific research and development, "many of them dig into military and social problems affected by technological advances".[31]

Industrial companies also contract out their "research activities with institutions such as Stanford Research Institute, a non-profit corporation which has moved into the fields of military and foreign policy".[32] Also, the Stanford Research Institute, works directly for the government, as well as other institutes "where the most highly organised strategy expertise is to be found."[33] Three of them are descendants of the post-war establishments created by the armed services: RAND, a large portion of whose research is mainly for the Air Force; The

Research Analysis Corporation (RAC) primarily serves the Army; The Center for Naval Analyses organised as a division of the Franklin Institute works for the Navy. Others such as the "Institute for Defense Analyses works directly for the Office of the Secretary of Defense and several of its components."[34] The institutes are valuable in terms of the link that they provide between private industry and the military Services. However, the institutes are equally, if not of greater value than the contractors, not only for their contributions in the research of new technologies, but the assistance that they render to the DoD Components in their formulation of new military requirements. It is ironic that more than twenty five years ago, some military leaders were of the opinion that, "there has been too little solid contribution from military pens to national security policy thinking ...".[35]

This discussion has not yet provided a clear determination of the precise point that a decision is enacted regarding the conception of a new weapon system. The suggestion is that there is no precise point, in the sense that a specific DoD Component is briefed on the system, his decision is confirmed after review of the information, and his decision is passed on to higher stations for approval. Naturally, this is an oversimplified version. A more accurate interpretation, which is suggested, would outline this approach as a two-tiered procedure (with fiscal approval), which is dependent on the advocacy of those involved in technological research and the military requirements to meet a Service's needs. On the one level, through continuous research, the technological basis and feasibility of a new system has to be established. This is executed by DoD

Components, contractors and research institutes. On the other level, a Service's requirements are formulated, scrutinised and reappraised not only within the domain of the DoD Components, but increasingly from outside sources - contractors, research institutes and even academia.[36] This is measured by the investment involved in R&D from the DoD.[37]

There must be a constant trade-off process between technologies and requirements. Thus, either the technology has to be further altered to match the requirement (more research and development needed); or the requirements or specifications have to be amended to match the available technology. The suggestion is that both trade-off processes occur simultaneously. However, whichever of the two occurs more frequently, that is the one which enjoys an increased relationship to the required level of technology and to the initial amount of advocacy for the programme is not clear. In other words, "the requirements are dynamic"[38] and systems requiring a high level of new technology, with many complex subsystems, would influence the DoD Components to be more compromising on their requirements. Perhaps this explains why systems tend not to meet the original requirements of the military 100 percent.[39] The original advocates of the programme are those involved in the research of the new technologies, whether it be DoD Components, and/or, those from the outside - contractors or research institutes. For example, in the early 1960s aircraft contractors were researching new designs in avionics, some of which were based on Major John Boyd's theories of the 1950s. Also, contractors such as Lockheed and Northrop were preparing "in house" reports detailing the future fighter of the 1970s and 1980s. It was not until 1965 that the Air Force initiated its F-X Study, based on some of these new designs, for the purpose of fulfilling the need for a new fighter to replace the F-4 and F-111, which had not performed well in Vietnam. In 1966 Major John Boyd was summoned to the Pentagon, to revise the F-X study with Pierre Sprey, a civilian Systems Analyst working in the Office of the Assistant Secretary of Defense, Systems Analysis. These two gentlemen, and others, became known as the "Fighter Mafia" because of their strong advocacy to push for their designs. Other details of all this are discussed in Chapter 5. However, it is apparent that contractors and scientists were researching new avionics designs before Air Force involvement. Also, the "Fighter Mafia", involved with the design of the new technologies, advocated for the prototyping (which came later), which enabled them to test these new designs. Military requirements would have had to have been secondary, because as the designs and research were being developed, certain expectations of the DoD Components were not feasible (for example, to attain the speed of Mach 3 like the Soviet Foxbat). On the other hand, certain items were not foreseen by the DoD Components. For example, an engine was investigated that had capabilities of 25,000 pounds of thrust, powerful enough, that only one engine was necessary to achieve the maximum performance of its designs. These factors and many others would be forcing the DoD Components to be constantly reappraising its requirements.

Regardless of which group might be compromising more than the other, the point is that the DoD Components exhibit a higher degree of activity, during the Concept Exploration Phase than their superiors. In fact, since July 1981, the decision making within DoD became more decentralised under the 33 experimental reforms initiated by Deputy SECDEF Frank Carlucci[40]. "The number of major decision making milestones in the acquisition process involving the Secretary of Defense has been reduced from four to two - requirements validation [Demonstration and Validation] and the program go-ahead through full-scale development."[41] This only formalised the non-involvement of the SECDEF. The DoD Components already had exerted greater influences than the SECDEF but, the reform indirectly increased the role of the Defense Resources Board (DRB). Prior to continuing with a discussion of this, some of the procedures concerned with the initiation of a new weapon system must be identified.

I-1 When the mission analyses, or the military requirements, conducted by the DoD Components, results in a service's wish to initiate a new major acquisition, a proposed Justification for Major System New Start (JMSNS) is prepared by the DoD Components. A JMSNS is required for all new starts in which the DoD Component anticipates to invest more than $200 million in funds for Research, Development, Testing and Evaluation and/or $1 billion in production.[42] The JMSNS defines the deficiency or opportunity, such that there is a reasonable probability to satisfy the need by the acquisition of a single system. It is not a broad definition of a few systems necessary to counter projected threats in a mission area, because that is part of the continuing analysis of mission areas rather than a part of a specific acquisition programme. Furthermore, the specific hardware solutions to fulfil the need are not defined in the JMSNS since it is the function of the Conceptual Phase to identify alternative concepts for satisfying the mission need. Incredibly, the JMSNS is not to exceed 3 pages and follows this format :

- Mission
- Threat on Basis of Need
- Existing and Planned Capabilities to Accomplish the Mission
- Assessment of Need
- Constraints
- Acquisition Strategy.[43]

The last component, Acquisition Strategy, has two-fold significance. First, it is proof that even at this early stage the DoD Components are actively working with private contractors to assist them in outlining a feasible acquisition strategy. Second, and more importantly, the contractor is in the process of assisting the DoD Components with technological developments.

<u>I-2</u> Once the proposed JMSNS has been processed within its own organisation, the DoD Component submits it to the Executive Secretary of the Defense Systems Acquisition Review Council (DSARC). The DSARC, acting as the leader corporate body for systems acquisition, provides advice and assistance to the Secretary of Defense. The Defense Systems Acquisition Review Council (DSARC) was established in 1969, "to review such programs and provide the Secretary of Defense with recommendations concerning the status and readiness of individual weapon systems to enter or continue in the acquisition cycle".[44] Further, it advises the SECDEF on Milestone decisions and other issues that the

Defense Acquisition Executive (DAE)[45] determines to be requisite within the Department of Defense. The DSARC is the decision making body in the Life Cycle for weapons acquisition. As is the case of the Defense Resources Board in the Fiscal Cycle, the Secretary of Defense is not a member of DSARC.[46] It is the responsibility of the Defense Acquisition Executive for the co-ordination of the JMSNS. "For each program the Defense System Acquisition Review Council (DSARC) meets to make formal recommendations to the Secretary of Defense at decision milestones".[47] For example, "Deployment of this [MX basing] system, with an initial operational capability of FY 1986, was recommended by the Air Force to the Secretary of Defense through the Defense System Acquisition Review Council (DSARC) on December 5, 1978."[48]

I-3 Based on comments from DSARC, the DoD Component modifies the Justification for Major System New Start (JMSNS) as necessary, and submits it with the Program Objectives Memorandum (POM) (See, Fiscal Cycle II-1 through II-5, Chapter 3, pp.125-129). All JMSNS must be submitted with the DoD Components Program Objectives Memorandum in which the funding is included for the major system's new start. An earlier discussion set forth the three different stages of budgets which remain active concurrently. The situation is the same for the POM. It is a case in which the 3 POMs, at different stages reflecting the stages of the 3 budgets, are under consideration by the DoD Components. It can be expected that at this level, trade-offs to ensure the balance of the needs of a new mission play a crucial role. "The function is to ensure that all separate inputs are molded into a coherent balanced force structure"[49] and these inputs must weigh heavily in the DoD Components decisions, in which new systems should have priority over others.

I-4 Presently, there are three avenues of approach which will substantiate a mission need determination :

1) the DoD Components recommendation is modified, the changes may be documented in a Program Decision Memorandum (PDM) (See, Fiscal Cycle II-5, Chapter 3, p. 129).

2) a joint Justification for Major System New Start (JMSNS) is submitted, for example, to the OSD and the Joint Chiefs of Staff, the decision is documented in a SECDEF Decision Memorandum.[50]

3) a JMSNS is included in the Program Objectives Memorandum (POM) and the inclusion of the new start is found in the DoD Budget, which is submitted to the Office of Management and Budget (OMB).

The third avenue is by far the best mode for a mission need determination because it formalises the link-up of the Life Cycle to the Fiscal Cycle, and having established that the SECDEF is not involved in this stage, the decision "to initiate a major weapon program is now completed as part of the budgeting process".[51] The integration of the acquisition decision making process with the budgeting process is to assure that "the proposed new program starts are affordable within the DoD's planning, programming, and budgeting constraints".[52] The Defense Resources Board (DRB) has the jurisdiction to review the budgets. Yet, the DRB also plays a role in the decision to initiate a new start. It is interesting that the DRB is involved with fiscal matters, as well as new starts - fitting them into budget constraints. Moreover, in 1981, the influence of the DRB was increased, indirectly under a "Carlucci Reform",[53] stating that the "DoD has also required the services to plan weapon systems development and acquisition on the basis of adequate funding by documenting, at major acquisition milestone decisions, whether funding is available to execute the program as designed".[54] The DRB reviews that via the Program Objectives Memorandum (POM) submitted by the DoD Components. As mentioned, the DoD Component essentially is concerned with three POMs, concurrently, allowing him the manoeuvreability to alter programmes or amend requirements. The added dimension of the private contractors co-operating so closely with the DoD Components also provides the contractors with a direct line of communication to the DRB.

Thus, it is perhaps a misnomer to make reference to a "decision to initiate". There are too many considerations and decision makers involved - requirements of the Services, level of technology and the degree of contractor involvement, DRB, OSD, *et al*. However, it is the DoD Components (and arguably the contractors), who are in the best position to influence the outcomes of the series of decisions to initiate. Whether or not the DoD Components continue to exert such influence throughout other stages is now to be tested.

The Hardware Phases	Decisions Made to Proceed to Next Phase
	DSARC I
II Milestone I - Demonstration and Validation	
	DSARC II
III Milestone II - Full Scale Development (funds to produce more prototypes for testing)	DSARC IIIA
	DSARC III (DSARCIIIA) (DSARCIIIB)
IV Milestone III - Production and Deployment	

[55]

These three hardware phases are temporarily consolidated by the author to help clarify the process. The purpose for grouping the phases is expressed in the following views : First, DSARC IIIA appears both before Milestones II and III. Where and when such a decision takes place is dependent on the weapon itself (for example, a gun versus an aircraft), some of which (the aircraft) take a longer time for completion of the Demonstration and Validation phase. Further, usually a major system requires a higher degree of technology and although prototypes, as in the case of the F-16, may have been funded, following a DSARC II decision; more research and testing would be necessary to fulfil differing requirements (DSARC IIIA Decision), before a final decision to produce (DSARC IIIB). Usually systems which are not major or require less technology follow the path of DSARC I, II, III. A second reason for grouping the three phases together is that the image of one group making a decision in one phase and then another group involved in Milestone II is a false image because they are the same actors (especially DoD Components) and they are concerned with all three phases at one time. For example, at one stage following the milestone planning meeting, three different draft documents are prepared jointly for Milestones I, II and III. This is not to say that three different Milestone decisions were made at precisely the same time, but that in preparation for the Milestone decisions the DoD Components consider these strategies for all three.

The third reason is that although the entire process is as similarly structured and complex as the Fiscal Cycle, it does not have the same time parameters set by schedule. The only time limits are exerted by the Fiscal Cycle, as seen in the previous stages of Mission Need Determination, whereby the Justification for Major System New Start is placed within the Program Objectives Memorandum and continues within the overall Fiscal Cycle. The scheduling of DSARC meetings are set according to the progress and completion of various documents discussed below. However, a DSARC meeting on the scheduling will sometimes coincide with the scheduling or progression of the budgeting process. This will be demonstrated in the case of the F-16. The fourth reason covers funds for the Demonstration and Validation, as well as funds for Production and Deployment. Occasionally, it will be solicited within the framework of the Fiscal Cycle. However, when considering the Life Cycle, it is wrong to completely separate the two because a system, once deployed, does not mean the Research and Development (R&D) of that system ceases. The point is that it is all right to view a weapon system along the continuum of the four phases when placing that weapon system within the constraints of the Fiscal Cycle it passes through many times. However, it is wrong to conceive a weapons system's life as passing through one phase to the next as if once completing Demonstration and Validation it is thus Produced and Deployed. For example, presently research is being conducted by Pratt and Whitney and General Electric to retrofit new engines to the F-16.

Deployment differs from Research and Development but the approach herein is to conceive of the life of a weapon system to be either in a non hardware stage or a hardware stage. This should be the formal criteria to determine the stage of development and the decisional centres concerned with that weapon system. As witnessed in the previous phase - Concept Exploration - Mission Needs Determination - the issues do not deal with hardware. They deal with needs and capabilities or the lack of such. As shown in the Justification for Major System New Start (JMSNS), specific hardware solutions shall not be defined, since, it is the function of the Conceptual Phase to identify alternative concepts for satisfying the mission need. Once a JMSNS is included in the Program Objectives Memorandum and then later approved by the Defense Resources Board (DRB) and right up the line to the next (Fiscal Life Decisional Process), the necessary hardware becomes the preoccupation of the Department of Defense (and all Defense related agencies and/or concerned contractors). Essentially, that is the point or junction when a weapon system's life begins to materialise. Various Defense related actors and hosts of various contractors enter and a scenario of competing strategies will eventually lead to the culmination of a weapon system - which may never have been deemed necessary or which does not fulfil the original mission needs of the Justification for Major System New Start (JMSNS).

Another reason for the grouping of all three phases is a structural one for this thesis. The documents outlined below are the same, though they have been updated with more information, from stage to stage. Also the same platform of scheduling usually applies. So as to avoid the appearance of redundancy, the documents and steps below are applicable to

DSARCs I,II,III. Following an examination of these, there will be a separation of the three phases in order to provide a more thorough understanding of each, respectively.

<u>II,III,IV-1</u> When the DoD Component makes sufficient progress within the previous phase (DRB and OMB approval), that Component requests the scheduling of a Defense Systems Acquisition Review Council (DSARC) meeting. Based on this request, the DSARC Executive Secretary (Under Secretary for Defense, Research and Engineering) schedules a milestone planning meeting. Prior to this DSARC meeting, the Office of the Secretary of Defense (OSD) action officer for the programme is the Chairman of the Milestone planning meeting which is held approximately six months in advance of this DSARC meeting. Representatives of DSARC attend this meeting to become informed of the needs and strategies before the above scheduled DSARC meeting. Though the format appears to be rather complex, it is interesting for the following reasons. First, the meeting is an avenue of communication between the DoD Components, Office of Secretary of Defense, and the Executive Secretary of DSARC. Second, and more importantly, though no formal documents are usually lodged (draft milestone documentation) and the documents which are later drafted do not receive input from the Office of the Secretary of Defense (aside from those addressed at that planning meeting). Essentially, again the major focus of the decision making is found within the DoD Component.

II,III,IV-2 After the milestone planning meeting, and based on the issues raised, the DoD Component prepares :

1) a for government draft System Concept Paper (SCP) for the Milestone I review, or a

2) for comment draft Decision Co-ordinating Paper, previously referred to as a Development Concept Paper (DCP), and

3) an Integrated Program Summary (IPS) for Milestone II and/or Milestone III*

4) Attached to the three documents will also be another known as the Test and Evaluation Master Plan (TEMP).

Once a programme has been initiated at Milestone O the DoD Components must support preparations for DSARCs I and II by "fleshing out the system concept from a field environment standpoint. Also, though appropriate analyses and experiments [DoD Component(s)] must determine how competing systems would be used and what their operational value would be. This involvement would become more intense, and more demanding of resources as the DSARC II decision point approaches ... that DSARC II should be emphasised as the point of 'big decision' when an explicit 'commitment' is made ...".[56]

(* Normally, the Milestone II decision is delegated to the Service Secretary unless any of the established Milestone II thresholds are breached)

1) Systems Concept Paper (SCP)

The Systems Concept Paper (SCP) which is prepared by the respective DoD Component (Office of the Assistant Secretary of Defense, Systems Analysis) provides the basic documentation for the Defense Systems Acquisition Review Council (DSARC) members in reaching a recommendation for the SECDEF. The System Concept Paper is used to summarise the results of the Conceptual Phase up to Milestone I, and to describe the DoD Component's acquisition strategy, including identification of concepts, which is likely to be carried into the Demonstration and Validation Phase, as well as credence for the elimination of other concepts. The Paper also includes the extent of competition planned for each subsequent phase, the need for industrial base capacity and of manufacturing developments. Furthermore, it includes the programme structure, and a discussion of how the acquisition process will be tailored to fit the programme; and it establishes the goals and thresholds to be attained at Milestone II.[57]

2) Decision Co-ordinating Paper (DCP)

The Decision Co-ordinating Paper (DCP) which is prepared by the respective DoD Component (Office of the Director [now called Under Secretary] of Defense, Research and Engineering (DDR&E)) summarises that DoD Component's acquisition planning for the system's Life Cycle and provides a management overview of the programme. "The total acquisition process from earliest concept definition to ultimate development was keyed to such devices as the DCP."[58] Ultimately, the DCP, becomes the contract between the SECDEF and the Service Secretary. Aside from its overview placed in the back of it, as an annex, is the first attempt within the DoD Component to assign costs under the heading of Life Cycle costs.[59] Although costs have already been reviewed by the DRB, this is an attempt to consider all of the costs involved in that weapon system for DSARC review. However, DoD Components, who are over-optimistic in their cost estimates, always neglect some costs.[60]

3) Integrated Program Summary

The Integrated Program Summary is prepared by the respective DoD Component and as the previous document (Decision Co-ordinating Paper - DCP) summarises the DoD Component's acquisition planning for the system's Life Cycle and provides a management overview of the programme. The difference between the two is, that it does not repeat the information of the DCP but provides more specific information and a comprehensive summary of the programme. The Cost Annex is further broken down into Cost Track Summary, Funding Profile, Summary of Acquisition Cost and Manpower.[61]

4) Test and Evaluation Master Plan

The Test and Evaluation Master Plan is prepared by the respective DoD Component and identifies and integrates the overall test and evaluation, plan objectives, responsibilities, resources and schedules, to be accomplished prior to the subsequent key decision points. An initial version of the Test and Evaluation Master Plan (TEMP) is prepared as early as possible in the acquisition process. Upon approval by the Office of the Secretary of Defense, any changes made in the TEMP must be properly documented to show the reasons for the changes.[62]

The evidence of the above four documents suggests a heavy involvement on the part of the DoD Components in the initial stages of the hardware phase. Essentially, this substantiates the point that decisions in weapon acquisition tend to radiate upwards especially considering the influence of these reports. It also substantiates that the contractors are in a position to influence these reports, because the DoD Components, aside from research and development, are dependent upon them for information regarding production costs et al. The assumption is, that the contractors are also optimistic in their initial cost figures.

II, III, IV-3 These four documents are then referred to the Defense Acquisition Executive (Under Secretary for Defense, Research and Engineering) of DSARC three months prior to the scheduled DSARC meeting. The Office of the Secretary of Defense action officer ensures that all members of the DSARC also receive copies, and he then prepares a formal Memorandum documenting the various comments submitted. These comments form the basis for the prepartion, by the DoD Component, of the final System Concept Paper, Decision Co-ordinating Paper and the Integrated Program Summary. These three final papers are then submitted to the SECDEF only 15 working days prior to the DSARC meeting.[63] Thus, the final documents were prepared before SECDEF review and such a short period of review would indicate that as seen in the Concept Exploration Phase, the lack of involvement of the SECDEF.

<u>II,III,IV-4</u> At this point, the Office of the Secretary of Defense Cost Analysis Improvement Group (CAIG), which acts as an advisory body to DSARC on matters related to cost, provides the DSARC with a review and evaluation of independent and programme cost estimates, which were <u>prepared</u> by the DoD Components.[64] Regarding cost overruns it is also at this stage that the cost estimates are apt to be overly optimistic. Two other groups, namely the Director, Defense Test and Evaluation and the Weapon Support Improvement Group, are also conducting staff level working meetings with the DoD Components Staff. The former Group is important because the staff (Defense Test and Evaluation) have principal responsibility within the Office of the Secretary of Defense for test and evaluation matters. Moreover, only ten working days prior to the DSARC meeting, the Defense Intelligence Agency (DIA) provides its report on the threat analysis. An interesting study would be to entail the original threat appraisals of the Mission Need Determination of the Justification for Major System New Start and see how they compare with those supplied here by the Defense Intelligence Agency after the threat has been evaluated and balanced against the hardware being considered. The point is that the threat would have to be amended or made more specific, due to the limits imposed on it by the hardware.

<u>II,III,IV-5</u> As a result of the above earlier working meetings, the OSD Cost Analysis Improvement Group, the Director, Defense Test

and Evaluation, and the Weapon Support Improvement Group prepare written reports for their respective areas of responsibility and make them available at least three working days prior to the DSARC meeting. Upon meeting, the Defense Systems Acquisition Review Council (DSARC) reviews these papers as well as the reports submitted. Following the DSARC meeting, the OSD action officer, in co-ordination with the DSARC Chairman (Defense Acquisition Executive), and the DSARC members and advisers, prepares a proposed Secretary of Defense Decision Memorandum. This is accomplished within five working days after the DSARC meeting. The proposed Secretary of Defense Decision Memorandum is submitted, by the Defense Acquisition Executive, to the SECDEF, for approval. The final Secretary of Defense Decision Memorandum (SDDM) is issued to the concerned DoD Component, within fifteen working days after the DSARC meeting. A favourable SDDM allows the DoD Component to begin work on the next phase of development.

Turning attention to enlarge the discussion of the DSARC decisional structure by including an examination of what is performed in each stage, and by whom, will further substantiate a greater influence from the DoD Components during these stages. Arguably, the separation of the three phases, as well as the grouping of them, is arbitrary. This is the inherent Catch-22 element in viewing weapons acquisition. Perhaps the best way to envision the entire process is to define it as an ongoing phenomenon, with decisional points to review its progress. Following post-evaluation, decisions of whether to continue or not, are promulgated.

II. Milestone I - Demonstration and Validation (Research and Development)

In 1975, the total budget for the national defense of the US was $85.6 billion, with $8.9 billion devoted to Research and Development (R&D) - a little more than 10 percent of the total defense budget.[65] This may not seem like a large amount in relation to the total, however, if a comparison is made with procurement that year, $16.0 billion, it is more than 50 percent that amount.[66] Various steps must be accomplished before monies are appropriated to Research and Development, Testing and Evaluation (RDT&E). They are as follows :

- A statement of operational need by a military command.
- In response, the formulation of a "mission element need" or "Justification for Major System New Start", and other (DCP) documents, which typically call for an R&D effort.
- Validation by the Office of the Secretary of Defense of the requirement for a new development (Milestone 0).
- Analysis (done by in-house groups and/or by contract with industry) of alternative ways of meeting the mission need.
- Selection of a limited number of options to be pursued (Milestone I, DSARC I).
- Selection of industrial contractors to perform the development.[67]

A review of the military departments' practices and policies in performing the tests and evaluations of weapon systems illustrates the level of involvement of the DoD Components and their influence. It should also be emphasised that the "tests and evaluations of weapon systems continue during the various stages of acquisition".[68] It is also helpful to be cognisant of the fact that "testing is a management technique for controlling activities to ascertain and minimise risk."[69]

According to a Report to the Congress by the General Accounting Office, there are only three basic categories of testing and evaluation :

1) Engineering testing to demonstrate, before a system is accepted for production, that it will perform as intended;

2) Acceptance testing to demonstrate that the state and quality of the weapon system fulfilled the legal and/or commercial requirements agreed to by the supplier and the customer;

3) Operational suitability testing to demonstrate that the weapon system, the operating personnel, and the tactical operations can work together to accomplish an established combat mission.[70]

The three definitions fit well into each of the three phases following Conception Exploration; Demonstration and Validation (engineering testing); Full-Scale Development (acceptance testing - especially in terms of DSARC IIIA before a DSARC IIIB decision is made); and Production

Deployment (operational suitability testing).

Research and Development Testing and Evaluation (RDT&E) should always be envisioned as a continuing process throughout the Life Cycle of a weapon system. This also suggests the reasons that it is difficult to separate these last three phases when considering specific aspects of the acquisition process. Perhaps this has blurred the decision making involved. Following is a discussion of engineering testing, which will be followed by the other two stages of the acquisition process.

Engineering Testing

Engineering testing is all scientific and objective testing done in the interest of experimentation, development and testing or proving a system or its parts. This type of testing will depend on its progress within the phase of Demonstration and Validation. For example, at earlier stages it could be computer analysis (paper studies and concepts) included in the Decision Concept Paper for a Milestone I (DSARC I) decision. On following the decision, and money having been appropriated, at the discretion of the Secretary of Defense (from R&D funds, thus avoiding Congress), it could be testing of different defined options to evaluate the best performance.

It is performed under controlled conditions to properly assess the physical properties and characteristics of the item being tested. Usually this is accomplished in such places as laboratories, wind tunnels, environmental facilities (for example, gravity-free environment) and ranges.

The testing is performed before accepting a system (or item) for production including a part, a subcomponent, or a subsystem or the entire system. (In Concept Exploration it may have involved model testing.) In Validation and Demonstration it involves mock-ups of major subsystems or models. (In development, it involves various types or degrees of prototyping.)

Repetitious a process as it can be, engineering testing is performed until success is achieved (or until the item is discarded). Practicality of the system dictates that success be defined in specific terms, as to both quantity and quality. Or, in the military vernacular, the success be defined by the acceptable "tolerances".

The entire process is "supervised by the developer; performed by a Government laboratory or contractor; and carried out by scientists, engineers, and technical experts".[71] Due to a lack of expertise, those in authority at the Pentagon would not be participating in this process. Moreover, structurally, the Secretary of Defense is not a member of DSARC, which reviews the System Concept Paper, or the Draft Decision Paper and other documents produced by DoD Components, and arrives at a Milestone I decision. Thus the assumption is inevitable, that the Secretary of Defense has less influence during this phase than the DoD Components. The greatest amount of influence would be found within the Office of the Under Secretary for Defense, Research and Engineering not only because testing and evaluation is within its jurisdiction, but the Under Secretary is the Chairman of DSARC.

Further, the DoD Components possess, as well as the expertise, "the political resources to eviscerate the managerial purposes of DSARC I, using it to legitimise very specific hardware specifications and gaining substantial leverage in the PPBS process".[72] The advantage that the DoD Component enjoys, aside from its expertise, is that due to the increased technological complexities of weapon systems, the "services became aware that the key to successful program advocacy lay in defining in as much detail as possible how a general need, or requirement should be met with a specific weapon system".[73] For example, the Commission on Government Procurement in 1972 described the Army's use of this practice in the mid-1960s as it sought to fund (DSARC II) the development of an armed helicopter before the program had been approved (DSARC I) -

> "Although the AH-56 Cheyenne helicopter appeared for large scale funding in 1965, it began years earlier in exploratory development under a project entitled 'aircraft suppressive fire'. Another project was called 'air mobility' which also helped finance this early armed helicopter exploration. In about 1963, the project was moved into an advanced development project listed as 'aircraft suppressive fire' and in 1964 became an engineering development activity identified as the 'aircraft suppressive fire system'. This was changed later to 'weapons helicopter' and still later to the 'advanced aerial fire support system'. With each change, the identifying project number was changed."[74]

Thus the influence of the DoD Components lies in both an institutional, as well as, a functional role that they perform. The institutional or organisational structure requires their inputs in determining mission needs, requirements, et al, for DSARC review. Second, the function of testing and evaluating, with contractors should support and compliment such documentation leading to changes in the mission requirement.

III Milestone II - Full-Scale Development

The Full-Scale Development phase is that segment of the acquisition cycle extending from the award of an engineering development contract until the end item is authorised or ready for production. The phase extends from Milestone II (DSARC II) to Milestone III (DSARC III). However, due to the expense and complexity of major weapons systems, a DSARC III-A decision may be taken to award a few more units for further testing. Such a decision should be included in this phase because a DSARC III-B calls for full production. Regarding testing and evaluation, the type of testing is Acceptance Testing which will demonstrate that the quality of the weapon system fulfils the requirements set by Milestone I (DSARC I decision). An examination of Acceptance Testing will further illustrate the DoD Components involvement.

Acceptance Testing

Acceptance testing is performed to prove that the quality of an item(s) fulfils the legal and/or commercial requirements agreed to by both the contractor and the Service (DSARC I); and that the item is satisfactory and acceptable to both parties. This is also referred to as performance testing (not to be confused with suitability testing which tests the performance in the context of an integrated combat operation). Prototyping is in this category of testing and evaluation. It tests the performance, or the evaluation of competing prototypes. The case of the F-16 versus the F-17 exemplifies this point very well.

Where feasible, it is performed on the entire system, for example, fighter aircraft, ship, tank, or missile. Most testing, though, is performed prior to final assembly (for example, testing of Pratt & Whitney F100 engine for the F-16, or radar components), under controlled circumstances to technically demonstrate the presence of the contracted state and quality of the system. It is the process by which the DoD Component assures itself that the contractor has, in fact, provided what was previously agreed upon. The results are eventually available for DSARC review.

Each item accepted should be tested by the DoD Component to the extent necessary that the quality of the item meets DSARC review. Thus, requirements may be altered to match the results of the testing of new technologies. At times, it may be justified to use scientific sampling techniques or intensive testing (stress over time on wing design - metal fatigue). Also this may be arranged with adequate contractual agreements with the contractor to reduce the costs of testing. For example, most of the testing was performed by General Dynamics beforehand. To save costs to the contractor, which are eventually charged to the Pentagon, testing was performed at two USAF Bases - Fort Worth Texas and Edwards AF Base, California.

Acceptance testing is conducted by "The Military Command expert personnel, or an independent chartered organisation, would perform acceptance testing at selection and upon completion of production".[75] Further, upon deployment, the using command would also perform acceptance testing when it receives the system, for example, the Air Force held trials of the F-16's performance at Edwards AFB.

Thus, regarding the specific issue of testing and evaluation during the Full-Scale Development Phase, the evidence would suggest little if any involvement from those at the top, except informing them of developments. Also, the DoD Components, through testing and evaluating, during the previous phase, had updated the documentation necessary for DSARC II review and are in the process of doing so again for DSARC III. It is the DoD Components' opinions and their interpretations of the results for a mission need, which is the weight of their influence. Further, at this stage - Milestone II - the involvement has become more intense measured by investment and the advocacy of a programme. It is "clear that development programs which lacked strong advocacy were much more likely to be cancelled than those which had energetic and dedicated advocates".[76] Such will be demonstrated in the F-16 programme with its "Fighter Mafia", some of whom were also DoD Components.

IV Milestone III - Production and Deployment

This is the stage at which the weapon system is produced in quantity for deployment. For a long term programme, like the F-16, the quantities procured will differ from year to year, depending on the budgetary constraints imposed by Congress, and the numbers chosen by them. Subsequent to those events, further testing and evaluation must be accomplished to substantiate a DSARC III (sometimes DSARC III-B) decision. This type of testing is referred to as operational suitability testing which demonstrates that the weapon system, the operating personnel, and operations work together.

Operational Suitability Testing

Operational suitability testing is performed to evidence that the weapon system can accomplish the mission, as part of an integrated combat operation. It is no longer an evaluation of the performance of a weapon system, but an evaluation of its integration to the other systems already in operation.

It is carried out in the field under simulated or actual combat conditions. For example, information would have been gathered about the performance of the F-16, following the Israeli attack of the nuclear reactor near Baghdad on 7 June 1981. After an analysis of its performance, the Service could again alter its requirements and thereby change that weapon's position in the overall force strategy.

Operational suitability testing is conducted to gain assurance that the weapon system, the operating personnel, and the tactical operations can work together to accomplish the mission of the new system. Also, to be noted, is that when a new system is included, older systems will also have their operations adapted. Thus, there will be testing on the older ones, as well as the new.

The testing would start as soon as the weapon is first wholly assembled during development, as a preproduction prototype, or when the first production models are available, before full-scale production and deployment. Both of these cases apply to the F-16.

Operational suitability testing must continue until an acceptable weapon is established and proven. The DoD Component must be satisfied, as well as DSARC, and eventually the Secretary of Defense, whose purpose then is to persuade the Congress that the weapon fulfils its needs. The actual testing is "performed by the using command, ie the military personnel who will be operating the weapon".[77]

It is understandable that those at the top (SECDEF, et al) can not be expected to be personally involved with the testing and evaluation throughout the phases of acquisition. This would be virtually impossible due to the specialisation and technical expertise involved, to say nothing of the hundreds of systems proceeding simultaneously through the acquisition process. However, the suggestion is that the DoD Components who are participating in the testing will be evaluating and amending mission needs throughout the Life Cycle. They have the first hand expertise, and have been witness to and involved in the various tests and so forth. Also, their opinions contained in the earlier mentioned documents (MENS, DCP) are instrumental and weigh heavily during DSARC review — an indication that the influences of decision making tend to radiate upwards. However, outside events, such as an international crisis (monitored by the managers as politicians) would place pressures on DSARC from above. For example, the Air Force losses during the Vietnam War, where the first "dogfights" took place in April 1965. Earlier, in the Korean Conflict the air battle exchange rate had been 6.2 (1,941 enemy aircraft downed against 152 losses) or a kill ratio of 10:1 or better. In Vietnam, the corresponding kill ratio was 3:1.[78] Perhaps, in this case, pressure may have come from above for a new fighter; it is evident that those figures, although consequences of the Vietnam War, were arrived at and amended through operational suitability testing. In other words, the performance was questioned within DoD corridors by the DoD Components and thus would create a new mission need. Unfolding after an agreement between the DoD Components (Air Force) and the Office of the Secretary of Defense on a Development Concept Paper in 1968, for the F-15, Congress did appropriate funds to acquire a system to make up for the poor performance beforehand.[79] However, for Congress to have made a decision on the F-15, it had to have been a system that was already technologically feasible as well as available in the near future to deploy. Those questions had already been answered through various tests conducted by DoD Components during the successive stages of development.

The significance is that the development of weapon systems and the decision making thereof tend to be located within, or influenced by, the DoD Components. The specific issue of testing and evaluation throughout a weapons system's Life Cycle was chosen not only to demonstrate DoD involvement, but also its importance as an issue for each phase to be accomplished. "Testing and evaluation is an important ingredient throughout the acquisition process. The responsibility for the success of testing and evaluation throughout the acquisition process lies with the developer, the user, and the contractor in different degrees and at different times".[80]

Aside from testing and evaluation, the influence of the DoD Components is further shown by the documents below, which are prepared by the DoD Components.

<u>1) Acquisition Strategy</u>[81] which is prepared by the DoD Component and is an overall plan to attain the end objective of the acquisition undertaking. An initial program Acquisition Strategy is developed for each major system acquisition when a new start is proposed. The Acquisition Strategy is unique for each programme, and is tailored to the circumstances surrounding the programme. It merits mention here because it encourages the DoD Components to obtain advice and assistance from business and technical advisers and experienced managers of other major system programmes. As stated earlier, this document supports the claim

of the DoD Components' close contacts with contractors as well as the importance of the DoD Components' inputs.

2) Research and Technology Work Unit Summary (DD Form 1498)[82] is prepared by responsible DoD Components to provide technical and management data for ongoing research and technology efforts being accomplished by the DoD Components within the Research, Development, Testing and Evaluation programme. Its functions include identifying scientists or engineers who are working in technical areas of interest so they may be contacted for further technical information and maintain current awareness through periodic review of progress statements. The importance is to keep in touch with business considering the high technology level achieved in modern weaponry.

3) Research and Development Planning Summary (DD Form 1634) [Air Force AFR 80-2 dated 12 May 1969, "Documents Used in the Management of Air Force Research and Development"].[83]

This document provides, as the title implies, a summary of Research and Development studies, analyses and projects. It contains a concise problem and objective statement; the approaches to be taken and their rationale; the key technical issues and most important - as a link to the Fiscal Cycle - the plans and objectives for the budget fiscal year plus one (FY+1). The form (DD 1634) is submitted twice yearly : first in May, on the plans and status of all projects; second, in September, on revisions or changes to the first submittal, and, as a technical back-up to assist in the review of the annual budget submission. Another significance of this document, is that it links money or resources available to a mission's need, and new technology.

4) Selected Acquisition Report[84] (SARs)
Mention was made earlier (see, Chapter 3, p.146 of these reports, but the importance here is that they are prepared by the DoD Components for all programmes designated as "major" by the SECDEF. Therefore when a Justification for Major System New Start (JMSNS) is proposed, the DoD Component provides a summary of current estimates of technical, schedule, quantity and cost information of the system. SARs are prepared four times a year for use by the Office of the Secretary of Defense for transmittal to Congress.

Congressional Weaknesses in Weapons Acquisition

Thus far, little has been said regarding the role of Congress, except perhaps its role in the budgetary process or a brief mention of its oversight capabilities. This has been intentional. Up to now, the purpose has been to demonstrate the role of the DoD Components and their performance in the decision making of weapons procurement. By law, though, the DoD Components are (supposedly) excluded from participating with or influencing Congress in its decisions concerned with the acquisition of weapons. However, as evidenced, contractors work closely with the DoD Components, and the suggestion is that the contractors, while influencing Congressional decisions through their lobbying efforts, do provide a means of communication between the DoD Components and Congress. But, before discussing this, it is necessary to examine the oversight role of Congress, and see if it compares with the relative inability of Congress to exercise the power of the purse. Pursuing this, establishes whether or not contractors are closely scrutinised by Congress, not only concerning their lobbying efforts, but also their performance in contracts funded by Congress. "The best known of these executive reporting requirements"[85] was mandated in 1975 by Congress - the Arms Control Impact Statements (ACIS) - which was to have profound effects on the selection and monitoring by Congress of the majority of weapon systems. The discussion below, should demonstrate the inability of Congress to effectively use its legislative and oversight powers granted it by this legislation.

The ACIS legislation required that arms control impact statements (ACIS) be included for selected defence programmes with three goals in mind :

- to make the executive branch formally and systematically consider the possible effects of proposed programmes on arms control;

- to improve the quantity and quality of information submitted to Congress on proposed defence programmes, so it can better deliberate the merits of these programmes;

- although unrelated to Oversight, it was also to enhance the role of the Arms Control and Disarmament Agency (State Department) in the national security making process.[86]

Regarding the first goal, "one is hard put to suggest that the outcome of defense decisions, since the passing of the ACIS legislation, would have been any different in its absence".[87] From 1975 to 1980, there is only one case of a Congressional decision in which an ACIS played a part - the August 1977 decision on funding for the enhanced radiation warhead (W-70, Mod 3) for the Lance Missile. Senator Hubert Humphrey convinced the Carter Administration that an ACIS was required prior to approval of the funding bill. Senator Humphrey, presenting it to the Senate, noted that, "the statement is one that really fits the description of on the one hand and on the other hand ... The conclusion is one that does not give much of a conclusion".[88] Regardless, the Senate passed the bill, without even knowing at the time whether the President would actually recommend continued development of the warhead. This suggests that the ACIS was useful as a procedural device, but not terribly important for its substantive content.

The second goal returns to an earlier mentioned problem of Congress' expertise or lack of it. Moreover, the ACIS is intended to make it possible for Congress to better deliberate the merits of proposed defence programmes, but as just noted, there is no direct evidence that this ever occurred between 1975-1980. But for Congress to do so, it would require a level of detailed expertise which Congress has generally seemed unable or unwilling to develop regarding security issues.[89] A Congressional Research Service (CRS) study outlined just this problem, but it also cast doubt on the inability of Congress to make effective remedies.[90]

With the staff of the committees so large, "the major responsibility for reviewing, analyzing and suggesting improvements [to ACIS] was assigned to the CRS and the GAO."[91] Whatever the merits of the CRS or the GAO, this procedure means that an "additional layer of bureaucracy is interposed between legislators who must exercise oversight and the actual analysis that informs their judgements."[92] Even with the availability of the CRS and GAO to inform Congress, "during the days of the Lance warhead debate, several [Members] thought that the W-70 Mod 3 was a chemical device, and certainly it [Congress] needs to understand that a neutron bomb is not entirely devoid of heat and blast effects."[93]

The example of ACIS demonstrates another weakness of the Congressional dimension. A similar situation, to be discussed, existed in the case of the F-16. The Congress inserted language in an appropriations bill, insisting that the Air Force and the Navy work together on producing a common fighter aircraft for both forces before further funds would be released. That was 1974, and to date, there is no such aircraft.

However, allocations and appropriations are still within the Congressional domain and various groups influence or lobby Congress to obtain funding for their defence system. "Pressure groups all told spend about a billion dollars each year to bombard Congress, plus another billion to shape decisions indirectly by priming constituents."[94] Thus, it is no wonder that, "legislative conflicts in Congress are resolved more often than not by political pressure, not by any rational presentation of the issues."[95] As a means to influence defence policy, access to the Members of relevant committees (Armed Services, Appropriations) is sought by these groups. For the Pentagon and armed services, it would appear that a strong lobbying effort should have the highest priority. While the SECDEF regularly makes presentations to the relevant committees to convince them of the merit of new weapons acquisitions and budget requests, "the lobbying activities of industry groups may be more powerful and more effective".[96] Also, "strictly speaking, it is illegal for the Services to lobby on Capitol Hill. They do a great deal of it under the guise of disseminating information."[97] Obviously, they accomplish this by passing their requirements upward to the SECDEF in DoD's Final Budget. Otherwise, they may be called upon as experts to testify. But more importantly, the suggestion is that the Services or the DoD Components accomplish their goals through their close working relationship with private industry which is maintained in two ways :

- As seen, the DoD Components work closely with private contractors particularly during the earlier phases of a weapon system researching new technologies and matching requirements. Further, the DoD Components are also actively working with contractors during procedures for testing and evaluation which take place throughout all of the phases.

- Retired military officers are "employed by defense contractors or by public relations firms retained by such contractors".[98] Either way, "when the Services really want something, they usually get it".[99]

"Of all the groups seeking to lobby for increased defense expenditures, the most effective and perhaps the most dangerous from the point of view of ensuring a balanced military establishment are large defense contractors."[100] Essentially, each of the contractors wants to promote its own weapon system and the most profitable over a long period of time are those labeled "big ticket", (fighter aircraft, ships, nuclear missiles and so forth). From the viewpoint of the contractor, if it should obtain the contract for such items, it could monopolise the market for future generations, in that system, by making relatively small modifications to it. Eventually, when that system is obsolete, the contractor can still do a "brisk business in spare parts at very profitable prices", to third countries that had purchased the system.[101]

"In view of the considerable economic spread effects of the production of big-ticket items, Congress is often sympathetic to the manufacture of these weapons systems."[102] The long term contracts of major systems create jobs, and from the viewpoint of Congress, especially Members of the House of Representatives, the creation of jobs in a constituency enlists supporters who will vote for him. The contractors understand this all too well, and in major systems, the contractor arranges subcontracts for components throughout the US to enhance his position. This happened in the case of the F-16 versus the F/A-18, where Northrop Corporation has subcontracts for the F/A-18 in a total of 44 states.[103] For now though, this discussion indicates that Congressional participation in defence planning, or the selection of weapons systems is relatively weak in relation to the Executive Branch and its Administrative Agencies. Further, the DoD Components are able to effectively obtain what they want, albeit indirectly from Congress. This will also be substantiated in the following Chapters, beginning with the actions of the contractors. But what must be kept in a proper perspective and applies equally both to the contractors and the Services, is that the resources available are limited. This affects their strategy in attempting to obtain contracts throughout the acquisition process. For example, if the Services are lobbying Congress, "the Services cannot mount one for every issue".[104] That is physically impossible, and applies to the contractors as well, in seeking priorities, or shifting their strategies to obtain funding, or to compensate for changes in the environment. Further, it is not to be envisioned that those contractors or Services involved in either continuous research or lobbying efforts, do not neglect other efforts from other Services or contractors - it is not that clear cut. More will be said of this in the discussion pertaining to the case of the F-16.

SUMMARY

There is more to the overall acquisition process than has been detailed in these three Chapters. For example, there are more subunits, the relationships of subcontractors to prime contractor, more documentation, other interest groups/agencies which affect the outcome of these decisions. However, what has been outlined is more than adequate to show that the decisional centres are diffuse, shifting and are not able to be comprehensively explained in terms of simple concepts.

Far greater research and understanding could be accomplished by examining any one single aspect mentioned above. For example, the varying influences exerted on, and the preparation of a Developing Concept Paper, of a given weapon system for DSARC review. That is not the purpose here. The reason for this thesis is that a new conceptual approach to viewing the reality of the decisional processes of weapons acquisition is imperative. However, to accomplish this, the conceptual lenses offered by previous accounts, must be disregarded. In essence, the world of decision making is a complicated phenomenon, and to explain it by simplifying, only distorts it. Or, as John Steinbrunner suggested, "it is important that such bear as close an approximation to the ways in which governments actually make decisions."[105]

In Part II, the case study of the F-16 is by no means a complete historical account, however, the events of the F-16 adhere to a chronological sequence of results outlining the evolution of the F-16, through the stages of weapons acquisition. The analysis of the case study commences with the operations of the contractors, participating in the programme, before the decision to initiate the undertaking, and continues by covering the developments up to and including the foreign sales of the F-16.

The purpose of examining the case study of the F-16, is not to extract nuances of defence decision making, but it is an investigation to make more conclusive the following points that have emerged from Part I. Initially, it should be apparent that there are a multiplicity of decisional centres entailed in the procurement of any weapon system. Simple models or catch-all phrases do not suffice in so much that also these decisional centres are dynamic, in the sense of shifting. Complicating this are many variables such as the influence of certain individuals, bureaucratic rivalries, organisational and structural pressures, financial constraints, interests of the contractor, and an array of widespread Congressional interests, to name a few, converging elements. Sometimes they overlap simultaneously, which affects, in different degrees, the outcome of the decisions. Moreover, there is an uniqueness inherent in each weapon system, and the organisational processes through which a weapon system passes are reappraised and in a constant state of flux - for example, the reforms of SECDEF McNamara, Deputy SECDEF Carlucci, Congress legislating the Arms Control Impact Statements, and many more.

However, the "constant" which exists within this overlapping of jurisdictions is found within the levels of the DoD Components. Further, due to the organisational structure, and the decentralisation of decision making within the DoD, the decisions radiate upwards which permits the DoD Components to exert a greater input in the decision than those in authority. This is especially pronounced in the earlier stages of weapons development, in which defence contractors enjoy a close working relationship with the DoD Components to research new technologies and match these with a Service's requirements. Also, the DoD Components maintain this partnership with the contractors throughout the entire life of a system, as demonstrated by the repeated testing and evaluation performed on the systems. Such is an indicator that due to the fast pace of technological advancements, the existing systems are upgraded, altered, or perhaps rendered obsolete. Thus, throughout the process, the contractors are within the position to exert pressures on the decisions.

As the development of a system advances and begins to materialise, an increased role is applied to the proceedings by those groups or individuals in authority. Presidential statements, JCS announcements to Congress on the merits of a system, or Secretary of State approval are not decisional points, but may affect the outcome of the decision. The real decisions have been determined beforehand, based on such variables pertaining to the amount of advocacy for the system, the thresholds obtained, the level of prior investments, and the feasibility of the available technology. These and other examples have far more impact on the decisions to produce and procure a system, than for example, Secretaries of State or Defense mustering support abroad or at home for a new system. Regardless, the duties of those in authority (SECDEF) are expanded as the weapon nears Full-Scale Development. However, the DoD Components have not abdicated their influence, even though this may appear to be the case.

The supposed gradual fade out of the DoD Components in the later stages will be further examined in Part II. But before turning attention to the case of the F-16, the increased roles of those in governance are usually in response to events outside of the environment of the Pentagon. This is the function of the SECDEFs (and others in authority). They act not only as managers of the DoD, but as politicians, exercising their expertise for the enhancement or maintenance of the decisions promulgated from below. Some of the examples of external pressures being exerted, which are discussed in Part II, are the following : Congress exercised its Oversight capabilities by stressing commonality for a similar fighter for both the Navy and the Air Force. Another example is, the negotiations and dealings, some through the State Department, which persuaded NATO allies to enter into, and participate in the coproduction effort to produce the F-16. Or the example of Presidents Nixon and Carter, who were engaged in foreign sales (some of which were a precipitate of a crisis - the fall of the Shah of Iran and cancelled orders of the F-16). Another example of outside involvement exerting pressures on the SECDEF is again the Congress, but in a different light. Earlier it was stated that Congress was the weaker link in defence planning and the related decisions to establish funding. As this thesis has emphasised, it would be incorrect to view Congress in this regard concerning weapons procurement in general, because the Congress is not as weak when reviewing foreign sales. Congress has legislated powers which permits it to oversee, review, or if it wishes, to cancel foreign sales. Consequently, the theme of this thesis, which is to express the reality of the decision making process in weapons procurement, unhindered by the handicap of applying simplistic conceptual models, carries over into Part II. Attention should now turn to a discussion of the events of the F-16 with this in mind.

N O T E S

1. Some defence and government literature refers to 5 phases instead of 4 - (1) concept formulation, (2) validation and ratification, (3) development, (4) production and (5) deployment. See, "The Importance of Testing and Evaluation in the Acquisition for Major Weapon Syste GAO Report, Washington DC, 7 August 1972, p.5. The reason for this is that due to the high costs involved, money is first appropriated for development systems before full production to test their worthiness etc. The Defense Acquisition Review Council (DSARC) has also split its decisional structure to reflect the changes, eg DSARC I, DSARC II, DSARC IIIA (Development) and DSARC IIIB (Production). However, the Milestone Decisions O, I, II, III, remain the same to accompany the 4 phases. The approach herein will be to follow the Milestone Decisions, and what transpires, and as to whom is involved, However, when examining the F-16, reference will be made to DSARC IIIA and DSARC IIIB decisions because the F-16 was a prototype programme - a "fly before you buy" acquisition.

2. "Acquisition of Major Weapon System", GAO Report, Washington DC, 18 March 1971, p.6.

3. Ibid, pp.6-9.

4. Ibid, p.10.

5. The Defense Acquisition Executive, is the Chairman of the Defense Systems Acquisition Review Council. Presently, the Under Secretary of Defense for Research and Engineering (also previously known as the Director of Defense Research and Engineering) is the Defense Acquisition Executive.

6. The Defense Systems Acquisition Review Council (DSARC) was established in May of 1969, by Deputy SECDEF Packard. Originally, DSARC was to advise the SECDEF at each critical milestone, before proceeding to the next phase. Today, it is not that direct. DSARC "departed most radically from devices of the McNamara period in the degree to which it encouraged the professionalism of the services". See, ROHERTY, J, "The Office of the Secretary of Defense : The Laird and McNamara Styles", New Civil-Military Relations, Tranaction, Inc., 1974, p.82.

7. DoDD 5000.1, Directive, See Appendix I.

8. RANSOM, H, "Organisation and Processes for Military Strategy", American Defense Policy, Johns Hopkins Press, Maryland, 1965, p.175.

9. Idem.

10. DoDD 5000.1.

11. "Acquiring Weapon Systems in a Period of Rising Expenditures : Implications for Defense Management", GAO Report, Washington DC, 14 May 1981, p.27.

12. Confusion often arises because the A-109 Circular states that DoDD 5000.1 is "hereby canceled". Essentially "hereby canceled" should be interpreted as supplementing the previous DoD Directive, or in the case of the OMB, the A-109 is added to the Directives. DoD continues to use the DoDD 5000.1 documents with revisions, referred to as "hereby canceled".

13. General Maxwell B Taylor, Chairman, Joint Chiefs of Staff (1962-64).

14. PALMER, B, "Grand Strategy for the 1980s", American Enterprise Institute, Washington DC, 1978, p.4.

15. Joint Strategic Planning Department, et al, See, pp. 103-110.

16. Quotation by former Deputy SECDEF Frank Carlucci (1981-82), quotation contained in, ANDREWS, W, "Meyer Warns of Global Strategy Gap", Army Times, 1 March 1982, p.6.

17. "Report on the Acquisition Cycle Task Force", Office of the Under Secretary of Defense for Research and Engineering, Washington DC, 15 March 1978, p.11.

18. Idem.

19. HEAD, R, "The A-7 Decisions : A Case Study of Weapons Procurement", American Defense Policy, Johns Hopkins Press, Maryland, 5th Edition, 1982.

20. Ibid, p.616.

21. Idem.

22. Ibid, p.617.

23. Ibid, p.616.

24. REPPY, J, "Military Research and Development : Institutions, Output, and Arms Control", as printed in, MARKAVY, R, and KOLODZIEJ, E, "American Security Policy and Policy Making", Lexington, Massachusetts, 1980, p.170.

25. HELMER, F, "Management Innovations in Systems Acquisition", American Defense Policy, 4th Edition, 1977, p.277.

26. REPPY, J, "Military Research and Development", op.cit., p.171.

27. Idem.

28. Idem.

29. Idem.

30. LYONS, G, "The New Civil-Military Relations", American Defense Policy, 2nd Edition, Johns Hopkins Press, Maryland, 1968, p.401.

31. Idem.

32. Idem.

33. POSVAR, W, "The Strategy Making Establishment", American Defense Policy, 2nd Edition, Johns Hopkins Press, Maryland, 1968, p.345.

34. Idem.

35. LINCOLN, G, Col., and STILWELL, R, Col., "Scholars Debouch Into Strategy", Military Review, Vol.40 (July 1960), p.70.

36. Some examples, Massachusetts Institute of Technology (MIT), Harvard Center for International Affairs, Washington Center of Foreign Policy Research (affiliated with Johns Hopkins University). In centres such as these are "found some of the most prominent strategic theorists who serve as key advisers to the government". See, POSVAR, W, "The Strategic Making Establishment", Viking Press, New York, 1969, p.82.

37. Total Research, Development, Testing and Evaluation funds for 1983 break down as follows : (in $ millions)

<u>Total</u> RDT&E	24,256.6
Industry	17,315.2
Govt - in house	5,496.5
Research Centres	564.7
Universities	880.2

"The FY 1983 Department of Defense Program for Research, Development and Acquisition", prepared by Under Secretary of Defense, Research and Engineering for 97th Congress, 2 March 1982, p.A-10.

38. "Requirements and Production Capabilities Are Uncertain for some Air Force, Navy, and Marine Corps Aircraft", GAO Report, Washington DC, 22 July 1982, p.1.

39. "DoD testing and analysis has shown that weapon systems or subsystems are not meeting their originally established performance goals". For example, "serious doubts remain about the performance of the XMI's [tank] turbine engine... the engine has yet to meet its reliability goals - the tank achieves only 145 miles between failures versus the 272 mile goal of the Army ... Thus the tank's potential performance on the battlefield should be tempered ...". See, "Issues Identified in 21 Recently Published Major Weapon System Reports", GAO Report, Washington DC, 12 June 1980, pp.1-9. The author also suggests that another complicating factor of systems not meeting their goals is due to the budgetary process because "the initial budget submissions are developed based on requirements generated about 18 months before the date the services expect to receive the funds ... The requirements are dynamic and fluctuate constantly with the passage of time. It is therefore not unusual for revised requirements ... because of changes in missions, repair cycles, failure rates" and "industry capabilities". See, "Requirements and Production Capabilities Are Uncertain for some Air Force, Navy, and Marine Corps Aircraft", GAO Report, Washington DC, 22 July 1982, pp.1-2.

40. Frank Carlucci, as Deputy SECDEF, issued an implementation plan in July 1981 outlining programme criteria. Known as the 33 Initiatives or the "Carlucci Reforms", the objective was to ensure a lower risk approach to weapon system design to reduce unit costs and decrease the time needed to field new equipment. See, DoD's Defense Acquisition Improvement Program : A Status Report", GAO Report, Washington DC, July 1986.

41. "Status of the Defense Acquisition Improvement Program's 33 Initiatives", GAO Report, Washington DC, September 1986.

42. DODD 5000.1.

43. DODD 5000.1 and DODI 5000.2. Recently the JMSNS has been simplified referring to it by the acronym MENS - Mission Element Need Statement for the basis of Milestone O decision.

44. "Guidelines for Assessing Whether Human Factors were Considered in the Weapon Systems Acquisition Process", GAO Report, Washington DC, 8 December 1981, p.3.

45. The Defense Acquisition Executive is the Under Secretary (formerly called Director) for Defense, Research and Engineering.

46. The membership of the Defense Systems Acquisition Review Council (DSARC) is as follows :

Chairman: Defense Acquisition Executive: Under Secretary of Defense, Research and Engineering

- Under Secretary of Defense, Policy
- Assistant Secretary of Defense, Manpower, Reserve Affairs and Logistics
- Assistant Secretary of Defense, Comptroller
- Director, Program Analysis and Evaluation
- Chairman, Joint Chiefs of Staff (or designated representative)
- Service Secretary

Source: Report to the Congress : "Acquiring Weapon Systems in a Period of Rising Expenditure : Implications for Defense Management", GAO Report Washington DC, 14 May 1981.

47. REPPY, J, "Military Research and Development", op.cit., p.172.

48. House Appropriations Committee, Department of Defense Appropriations for 1980, pp.217-18.

49. KORB, L, "The Process and Problems of Linking Policy and Force Structure through the Defense Budget Process", as printed in, HARKAVY, R, et al, "American Security Policy and Policy Making", op.cit., p.188.

50. The Secretary of Defense Decision Memorandum (SDDM) is prepared by the OSD Action Officer which documents the SECDEF's Milestone decision including approval of goals and thresholds for cost, schedule, performance and so forth. Essentially, it provides the guidance and direction to the OSD and the DoD Component for the next phase of acquisition. Reference: DODD 5000.1; DODI 5000.2.

51. "Status of the Defense Acquisition Improvement Program's 33 Initiatives", GAO Report, Washington DC, September 1986, p.39.

52. Ibid, p.49.

53. See, footnote 40 in Chapter 4.

54. "Status of the Defense Acquisition", op.cit., p.49.

55. DSARC I through DSARC III (IIIB) is the same group comprised of the members listed in footnote 46 in Chapter 4. The number, after DSARC, is used within DoD to denote at which stage of the acquisition process, the decision is being considered.

56. Report on the Acquisition Task Force, op.cit., pp.15-16.

57. DODD 5000.1; DODI 5000.2. Also, See "Acquisition of Major Weapons Systems", op.cit., p.55.

58. ROHERTY, J, "The Office of the Secretary of Defense : The Laird and McNamara Styles", op.cit., p.82.

59. Idem; For further discussion of the Decision Co-ordinating Paper refer to footnote 34 in Chapter 5.

60. The method to be optimistic about costs is not to lie about the costs as such, but future considerations such as operating and support costs are easily deleted. "We emphasised that when making development decisions, more consideration should be given to ownership costs for the life span of a weapon system. These costs are characterized as operating and support (O&S) costs ...". Letter from Mr R W Gutman, Director, Procurement and Systems Acquisition Division of the General Accounting Office to Secretary of Defense, Harold Brown, 2 March 1978, p.1.

61. DODD 5000.1; DODI 5000.2

62. DODD 5000.3.

63. "Guidelines for Assessing whether Human Factors were Considered in the Weapons System Acquisition Process", GAO Report, Washington DC, 8 December 1981, pp.4-5.

64. DODD 5000.4.

65. Eight years later in 1983 it was $214.8 billion with $24.2 billion - 10 percent of the Defense Budget. See, "Statistical Abstract of the US", US Department of Commerce, 1984, p.343.

66. Procurement for 1983 was $55.2 billion, Idem.

67. LONG, F, REPPY, J, "The Genesis of New Weapons, Decision Making for Military R&D", Pergammon Press, New York, 1980, p.10.

68. "The Importance of Testing and Evaluation in the Acquisition Process for Major Weapon Systems", GAO Report, Washington DC, 7 August 1971, p.5.

69. Idem.

70. Idem.

71. Ibid, p.6.

72. DEAGLE, E, "Organisation and Process in Military R&D", as printed in, LONG and REPPY, "Genesis of New Weapons", op.cit., p.168.

73. Ibid, p.169.

74. "Report of the Commission on Government Procurement", Washington DC, US Govt. Print. Off., 1972, p.130.

75. "The Importance of Testing and Evaluation in the Acquisition Process", op.cit., p.7.

76. Report on the Acquisition Task Force", Office of the Under Secretary of Defense for Research and Engineering, Washington DC, 15 March 1978, p.45.

77. "The Importance of Testing and Eveluation", op.cit., p.8.

78. SCHEMMER, B, "USAF's Fighter Crews Train to Win in TAC's Air Combat Program", Armed Forces Journal International, May 1974, pp.30,38.

79. DORFER, I, "Arms Deal - The Selling of the F-16", Praeger Publishers, New York, 1983, p.4.

80. "The Importance of Testing Evaluation", op.cit., p.8.

81. DODI 5000.2.

82. DODI 7720.13.

83. DODI 7720.16.

84. DODI 7000.3.

85. HAAS, R, "The Role of Congress in American Security Policy", American Defense Policy, Johns Hopkins Press, Maryland, 5th Edition, 1982, p.553.

86. "Statements that Analyze Effects of Proposed Programs on Arms Control Need Improvement", GAO Report, Washington DC, 20 October 1977, p.18.

87. BUTTERWORTH, R, "The Arms Control Impact Statement : Program and Logic", as printed in, HARKAVY, R, KOLODZIEJ, E, "American Security Policy and Policy-Making", Lexington Books, Massachusetts, 1980, p.150.

88. Senator Humphrey speaking for the ACIS, US Congress, Senate, 95th Cong., 1st Sess., 13 July 1977 (Congressional Record S11763-S11764).

89. See. ASPIN, L, "The Defense Budget and Foreign Policy", American Defense Policy, 4th Edition, 1977, pp.321-334.

90. "Evaluation of Fiscal Year 1979 Arms Control Impact Statements : Toward More Informed Congressional Participation in National Security Policymaking", Congressional Research Service, Washington DC, 3 January 1979.

91. BUTTERWORTH, R, "The Arms Control Impact Statement", op.cit., p.158. The Congressional Research Service (CRS) is the policy and research arm of Congress. There are approximately 800 employees answering nearly 200,000 requests annually from Members,

committees and staffs and provide issue and legislative briefs, background reports and analyses. See, CARROLL, J, "Policy Analysis for Congress", US Govt. Print. Off., 1976. The General Accounting Office (GAO) is another source of information for Congress, however it differs from the CRS in its additional role of "watchdog". Founded in 1921, the GAO oversees and audits federal government programmes and operations in the US and 78 foreign countries with over 4,000 employees. See, POIS, J, "The General Accounting Office as a Congressional Resource", in Congressional Support Agencies 1980. The other two "arms of Congress" are, The Office of Technology Assessment (OTA) and the Congressional Budget Office (CBO). Similar to the CRS, the OTA was established in 1972 to provide Congress with an independent source of scientific and technical expertise. See, CASPER, M, "The Rhetoric and Reality of Congressional Technology Assessment", Bulletin of the Atomic Scientist 34, No.2, 1978. The CBO, created in 1974, provides Congress with an overall budgetary perspective and presents analyses of policy options in terms of budgetary implications. See, SCHICK, A, "The First Years of the Congressional Budget Process", Congressional Research Service, Washington DC, 1976.

92. Idem.

93. Ibid, p.159.

94. COLLINS, J, "US Defense Planning : A Critique", Westview Press, Boulder, Colorado, 1982, p.81.

95. HAAS, R, "The Role of Congress in American Security Policy", op.cit., p.551, quoting ASPIN, L, "The Defense Budget and Foreign Policy", op.cit., p.164.

96. FELD, W, and WILDGEN, J, "Congress and National Defense", Praeger Publishers, New York, 1985, p.36.

97. ASPIN, L, "The Defense Budget and Foreign Policy", op.cit., p.322.

98. FELD, W, and WILDGEN, J, "Congress and National Defense", op.cit., p.36.

99. ASPIN, L, op.cit., p.322.

100. FELD, W, et al, op.cit., pp.36-37.

101. ETZIONI, A, "Lobbyists Can Be Disarming", International Herald Tribune, 19 April 1984, p.4.

102. FELD, W, et al, op.cit. p.37.

103. For a discussion of the subcontracts for the F-16 and F/A-18, See, pp. 311-316.

104. ASPIN, L, op.cit., p.322.

105. STEINBRUNNER, J, "Beyond Rational Deterrence", World Politics 28, No.2, January 1976, p.223.

CHAPTER 5

THE CONCEPTION OF THE F-16

The Non-Hardware Stage of the Lightweight Fighter F-X Concept

The F-16 multinational programme is a multimillion dollar co-operative undertaking between the United States and four NATO countries, Belgium, Denmark, the Netherlands and Norway with the prime contractor being General Dynamics. The General Dynamics YF-16 (F-16) is a fighter plane which is a compact, single-seat, single-engine aircraft designed to achieve air superiority over other aircraft in air-to-air combat, and to carry over 15,000 pounds of missiles and bombs on air-to-ground missions. The F-16 is slightly over 47 feet long, with a wingspan of 31.3 feet, including two missiles at the wing tips, and an overall height at the tail of 16.3 feet. The aircraft weight, with full internal fuel, is 21,000 pounds, with maximum take-off weight of 31,000 pounds. Maximum external payload is 15,200 pounds. It is powered by the fully developed Pratt and Whitney F 100-PW-100 turbofan engine (the same 25,000 pound thrust engine that powers the US Air Force F-15 Eagle).[1]

The F-16 "multirole fighter" emerged from the Light Weight Fighter programme, which was initiated by the US Air Force during the early 1970s in response to rising costs. The acquisition cost of tactical aircraft has risen steadily since World War II.[2] This was partially due to the development of increasingly sophisticated avionics and weapons technology. Also, although inflation accounted for some of the increase, "most of it is attributable to the greater size and technical complexity of modern planes, as well as the declining rates of production that have accompanied the rise in unit costs.[3]

The General Dynamics F-16 (also referred to as the Fighting Falcon) was one of the stars of the 1977 Paris Air Show. Aside from it being one of the "hottest", and probably at the time, the most controversial fighter in the Western world, many observers were intrigued not only by the aircraft itself, but by some who were photographing it. One person in particular, dressed in a suit that was distinctly out of date, and equipped with a Russian camera fitted with a large telephoto lens, was photographing the aircraft, not from close up, but from a range of several hundred yards. The resulting photographs were no doubt examined in an East European Defence Ministry a few days later. However, the whole exercise might have been much easier had the photographer simply approached the aircraft, like everyone else, and accepted photographs and a booklet showing basic design and potential capabilities from two General Dynamics men on duty beside the aircraft.[4] This story was repeated amongst interested observers, who, although they found humour in it, also realised the seriousness with which the Warsaw Pact was taking this new warplane - even if their intelligence gathering method was unsophisticated.

Although the F-16 made its debut in 1977, it had flown by "accident" four years earlier on December 13, 1973, at Fort Worth, in what was supposed to be a high speed taxi trial. To the surprise of General Dynamics pilot, Phil Oestricher, the aircraft oscillated and, realising that the aircraft's horizontal tailplane had hit the runway, he knew that the best way to resolve this difficulty was to become airborne - a brief six minute flight followed and the F-16 was brought in to a smooth landing.

The debut of the F-16 and its first flight were turning points for the F-16 programme. However, how the Air Force and/or the Defence establishment turned concepts and needs into the hardware of the F-16 is the major emphasis of this Chapter. This matter can be brought to light by first, turning attention to the events and earlier contractor actions before the conception of the F-16. The case study of the F-16 can be better appreciated if firstly there is a discussion of the procedures, the activities of various DoD Components, and particular individuals credited with the F-16 programme.

Early Contractor Actions

In the mid-1960s, the United States was heavily involved in the South East Asian conflict. Over North Vietnam, the US pilots found themselves unable to match the kill rates of the Korean War. Instead of a 10:1 or better kill ratio of the earlier conflict, they achieved at best just over 3:1, a figure which steadily fell. Throughout the Vietnam Conflict, and for an extended period of time, the US services claimed to have maintained permanent superiority over the MIGs, quoting rates of just over unity at worst. In certain battles, the ratio came out slightly in favour of the Vietnamese.[5]

The Air Force, which at the time had no new tactical fighter or attack designs which could be put rapidly into production, was procuring adaptations of two US Navy Aircraft - the McDonnell Douglas F-4 and the Ling Temco-Vought (LTV) A-7. Additionally, the General Dynamics (GD) F-111 (formerly the TFX) was in production for the Air Force. However, numerous problems then associated with the F-111 programmes, raised questions as to both the length of its production run and its utility in the Vietnam arena.[6]

The Air Force also had contracts with two other aircraft companies, Lockheed and Northrop. Approximately 300 Lockheed Starfighters[7] had been procured by the Air Force in the late 1950s and early 1960s. As this production run was entering its final stages in 1959, Lockheed won a European fighter competition and subsequently established a four-nation consortium (Germany, Italy, Belgium and The Netherlands) to co-produce a heavier, multi-mission Starfighter - the 21,000 pound F-104G. The successor of this consortium eventually paved the way for additional co-production arrangements in Canada and Japan with the F-104 sales finally reaching approximately 2,500 in 15 countries.[8]

In 1962, the Air Force awarded Northrop a contract to produce the F-5 Freedom Fighter, a very lightweight (13,000 pound) twin-engined tactical fighter based on the Northrop T-38 jet trainer used by the Air Force since 1961. The objective of the Department of Defense was to develop a simple, inexpensive but reasonably capable fighter which could be provided or sold to those countries which could not afford, or lacked the capability to operate, more complex aircraft.[9]

Both Lockheed and Northrop developed support sites and field offices in each of the countries operating their aircraft, with Lockheed more actively involved at the six foreign F-104 manufacturing sites. On the surface, such support sites and field offices were necessary simply for either manufacturing or operating aircraft. However, Lockheed and Northrop both produced in-house reports detailing that in the future 1970s and 1980s many other fighter aircraft worldwide would have to be replaced, and each projected in its report that their established international connections would give them an edge over other US fighter manufacturing competition in capturing a large percentage of this market.[10] Furthermore, both companies concluded that the share of the Free World market which they might lose to sales of the F-4 (McDonnell Douglas) and F-111 (General Dynamics) would be small because the heavier weights of the aircraft and its greater complexity would result in excessive costs to many countries. These companies were accurate in that appraisal. For example, in 1971, "the trouble-plagued F-111 was being delivered at a fly away cost of more than 8 million dollars".[11] Two years later, in 1973, a declassified Air Force study for the General Accounting Office announced that they were happy to report that "the F-111 aircraft average unit decreased from $15.9 million to $15.01 million".[12] An increase of almost 100 percent in two years!

At the time, the only other viable foreign competition was considered to be the French Mirage series of aircraft made by Avions Marcel Dassault, whose Mirage III fighter had lost to Lockheed in the earlier European fighter competitions.[13] In the mid-60s, Britain and France had joined forces briefly with the hope of developing the Anglo-French Variable Geometry (AFVG) fighter; however, the project was abandoned in 1967. Also in 1967, the Air Forces of Belgium, the Netherlands, Italy, Canada and West Germany (with Norway and Britain observing) aligned to develop the concept for the Multi-Role Combat Aircraft (MRCA). Lockheed's replacement aircraft strategy focused heavily on the existing F-104 (Lockheed) markets and manufacturing sites. It was their goal to design a new fighter with considerably improved performance compared not only to the existing F-104 but also potential threat aircraft, and yet maintain a very high degree of commonality (70 to 80 percent) with the F-104. The philosophy behind such a strategy was simply that such a design, by retaining proven parts and equipment to lower costs, would be especially attractive to those countries already procuring and/or operating the F-104. Furthermore, it was reasoned that, after the initial success of such a programme, other buyers would join in its momentum.[14]

Northrop, then regarded as the primary manufacturer of small fighter aircraft, was somewhat more ambitious. In addition to planning modifications for the F-5 Freedom Fighter to improve its performance and capabilities (Northrop's strategy for the F-5 was similar to Lockheed's strategy for future markets with the F-104), Northrop set out to design a new fighter responsive to force modernisation requirements perceived by many NATO countries for the late 1970s. At the time, NATO was considering the replacement of 4 current fighters (F-100, F-104G, F-5, F-4) with a single aircraft backed by standardised training, logistics, weapons and tactics.[15] Aside from the arguments of Rationality, Standardisation and Interoperability of Weapon Systems,[16] costs would also be a major factor. The other factor would be whether to buy US or French (later Mirage F-1 in competition with F-16). Essentially, the posture taken at that time was that "the effect on NATO air power in Europe would be dramatic indeed if the US and European countries used the same aeroplane and the same maintenance facilities".[17]

Aside from Northrop being sympathetic to future force modernisation, it was also cognisant of Lockheed's evolving "CL" design series for a smaller fighter. From Northrop's research centre, a new fighter design known as the P-530 Cobra emerged.[18] The P-530 Cobra was designed to the same medium weight as the Lockheed "CL" design, but incorporated advanced high-lift aerodynamic design concepts and new engines to achieve a top speed of Mach 2 (twice the speed of sound) minus variable geometry engine inlets.

This was an example of the various in-house strategies contemplated by contractors. Earlier, it was mentioned that contractors who are engaged in the pursuance of a continuing strategy, cannot neglect the efforts of other contractors. The case here is interesting because each contractor was very aware of the presence of the other. Lockheed and Northrop, respectively were cognisant that the other was researching future European markets, developing new or evolving designs, and naturally investing heavily in the production of aircraft. Even though Lockheed and Northrop were competitors, the importance of this competition was diminished in the consideration of the decision making of DoD Components. What was of concern was the relationship with the contractors based on the F-104 and F-5 programmes, and the performance of these aircraft under review from testing and evaluation. However, of greater consideration was the amount of participation of the DOD Components in the research and development of new technologies of aircraft design with Northrop and Lockheed. This amount of participation was measured by the investment from the DoD.

Although the design of the P-530 Cobra was a step forward in avionics, a revolutionary and unusual sales concept also emerged. Northrop envisioned an eventual multi-national co-production consortium similar to the Lockheed F-104 manufacturing group, which was already in progress. The unusual sales plan was designed along the commercial airline practices. The programme was financed by advance commitments from those nations wishing to participate; thereby alleviating the dependency on US Government funds. Under this concept, Northrop's plan was to evolve the P-530 Cobra from a two-phased programme consisting of a pre-production or development effort to validate the design and flight test several aircraft, followed by a production phase including delivery of the aircraft. Northrop would commit itself in either of two ways :

1) Northrop would commit itself to initiate the entire two phases with firm orders for 400 aircraft;

2) Northrop would conduct the pre-production phase upon receipt of $100 million[19] and proceed with production when 400 orders were obtained.

As an inducement, Northrop determined that when applying the learning curve to an order exceeding a quantity of 750 aircraft, subsequently a unit price of $3 million would be the cost of the P-530 Cobra.[20]

Northrop, after having suffered a setback in Europe[21] reasoned in the summer of 1968, that the US Government backing would enhance their European sales efforts. Northrop did request and receive Office of the Secretary of Defense (OSD) support for their proposed P-530 multinational development. In a letter of 23 August 1968, Deputy Secretary of Defense, Paul Nitze, pledged $4 million in development funds to Northrop for Fiscal Year (FY) 1969.[22] An earlier discussion outlined that the Deputy Secretary of Defense is Chairman of the Defense Resources Board (DRB) which is responsible for matching funds with needs.[23] However, it is all the more interesting to note that the letter to a private contractor was sent by the Deputy and not, as one would assume, the Secretary of Defense, especially considering a commitment of $4 million. Further, funds for research and development were made available at the discretion of the SECDEF. However, this was the time of year for appropriations and the Secretary of Defense ~~was~~ concerned more with the politics involved for securing funds. The letter also cited the reasons for such a commitment, mentioning Northrop's extensive development efforts, the impossibility of modifying existing US aircraft to match the predicted performance and cost of the P-530. As a condition to these funds, Northrop had to devise a development and production schedule acceptable to the Department of Defense, and also obtain at least $15 million from two foreign countries for the first year's development effort. Furthermore, there was no mention of any further commitment of additional Department of Defense funds after FY 1969. Despite efforts, Northrop was unable to secure the required financial support abroad and the Department of Defense used the P-530 funds elsewhere. However, as a result of this recognition and the interest of the Deputy Secretary of Defense, the US Air Force did conduct a limited evaluation of the Northrop P-530 design in September 1968, but the test was restricted to assessing the validity of Northrop's claims for the P-530 as an export sales aircraft rather than as an aircraft which might be responsive to US Air Force fighter needs. Northrop's multinational development strategy to compete with Lockheed had failed with the P-530 Cobra. Nevertheless, Northrop reconsidered its strategies, and the P-530 became an integral component of the F-X studies - studies that were already in progress to determine the future needs of US Air Force fighters.

Early DoD Actions

As early as 1965, the US Air Force (USAF) had begun concept-formulation studies of new high performance fighters. These included a heavy 60,000 pound interceptor/air superiority fighter designated Fighter Experimental (FX).

Within the Office of the Assistant Secretary of Defense, Systems Analysis (OASD/SA), in July 1965, the Air Force and the Office of the Secretary of Defense (OSD) initiated a programme of study, entitled the Joint Air Force/OSD FX Effort, to bolster the Air Force tactical strength as rapidly and economically as possible.[24] "Pressure was exerted from OSD Systems Analysis for a new study,"[25] (eventually shortened to be called the F-X Study). The Office of the Assistant Secretary of Defense, Systems Analysis, a DoD Component, is instrumental in producing the Systems Concept Paper in the early stage of a weapons system's Life Cycle.[26] It should also be noted that a member of the "F-16 Fighter Mafia", Pierre Sprey (a civilian), was working at that time within the OSD, Systems Analysis. At this stage, those involved in the F-X Study, splintered into two groups advocating their perceptions of Air Force tactical strength. Presently, this continues to play a role in the F-16, F/A-18 and F-20 debate.[27] One group perceived a greater need for an increased ground attack capability and supported those within the Office of the Secretary of Defense for service commonality in favouring the development of an Air Force version of the Navy's A-7. The other group advocated an increased air-to-air combat capability and therefore pushed for the Air Force to procure the F-5. Following much debate, the Air Force opted for the A-7 in November 1965.[28] Although this decision was hailed by some as a victory for ground attack or commonality advocates, more importantly, it established the argument for developing a new air superiority-oriented Air Force fighter. Further strengthening this argument were the successes of the Soviet MIG fighters in the 1965 Vietnam air combat encounters which proved the error of assuming US air superiority.

The consequence of the above decision was to bolster another F-X study, chartered by the Air Staff.[29] The "Concept Formulation Phase" for this new F-X was initiated in December 1965 with the release to the aircraft industry of requests for new design studies.[30] With the range, payload and performance requirements which had been provided to the contractors, many designs proposed by several contractors were evaluated during this phase. A multi-purpose fighter weighing about 60,000 pounds with a variable-sweep wing was advanced by the Air Force Systems Command's (AFSC) Aeronautical Division (ASD). However, concern was raised not so much because of its size and heavy wing loading but because of its similarities to the F-111 which prompted the Air Staff to request additional expertise from within the Air Force to review this design. Although this decision permitted greater review of various designs, it more importantly signalled to the Office of the Secretary of Defense that the Air Force was better equipped than the Navy and/or the Office of the Secretary of Defense in designing a superior aircraft. Thus the Air Force deafened their ears to the Navy's and the OSD's argument of commonality arrived at by the previous F-X study.

This is typical of inter-service rivalry, of which the Defense Blue Ribbon Panel stated that the establishment of military requirements is a "service unilateral" process. "There is no opportunity for the Office of the Secretary of

Defense to review total requirements for priority, urgency, or duplication before they are screened and filtered by the Services".[31] This not only substantiates the large role played by the DoD Components in the decision making, but also, this places the SECDEF in a relatively difficult "position either to establish options outside the agenda of service requirements or to modify major features of the requirements the services propose".[32] This is an additional weakness of the SECDEF. Inter-service rivalry fuels this situation in that "the services jealously guard their power. Their autonomy in defining and developing weapons systems is central to their ability to define their mission capabilities and operational roles".[33] Regarding the commonality argument, it is in the best interests of the Navy to side with the OSD to increase its jurisdiction and mission role. It would have been detrimental to the Air Force to have the Navy encroach into their arena, thus, all the more reason for the Air Force to stress air superiority and to continue lobbying for the F-X study.

By the Spring of 1967, the Air Force favoured a more manoeuvreable 40,000 pound fighter with a variable-sweep wing. However, because of the characteristics of the variable-sweep wing, more in depth studies commenced to compare the performance, cost, and risk of this feature with those of a fixed wing design. Furthermore, in July of 1967, at the Moscow Air Show, the Soviets displayed the new Soviet Mach 3, a high altitude Foxbat fighter. This showing, as perceived by the second group in the first F-X study (who were against Air Force and Navy commonality), added impetus by underlining the need for a pure air superiority fighter. The Air Force's argument for a pure air superiority fighter gave rise to the high/low mix concept. Second, the other reason for the concept was rooted in the high cost of high performance aircraft. The high/low (also sometimes referred to as hi/low) force mix concept incorporated a large number of less expensive weapons systems with a smaller force of very expensive systems, such as the Navy F-14 and the Air Force's F-15, which according to the result of the F-X study, ensured air superiority. Again, commonality was a factor which increased the Air Force's emphasis on air-to-air manoeuvring. However, performance was of greater value than the belief of both the Navy's and Office of the Secretary of Defense's commonality advocates who were pushing for the multi-mission Navy VFAX design to meet the Air Force needs. Therefore, according to them, the decision should be made by the two Services. This arrangement was unacceptable to the Air Force, because the Navy would then have influence in the Air Force's decisions.

In September 1968, the Air Force and the Office of the Secretary of Defense reached conceptual agreement on the F-X which was thereupon designated as the F-15. The Air Force gained approval from the Office of the Secretary of Defense to pursue Contract Definition for an aircraft which would replace the F-4E as the first line counter-air fighter in the 1975-1985 time frame. In the Development Concept Paper, today referred to as a Decision Co-ordinating Paper,[34] it was argued that :

1) the F-15 would be a single seat, fixed wing, twin-engine fighter in the 40,000 lb weight class;

2) a competitive prototype fly-off was <u>not</u> a suitable means for selecting a contractor;

3) the Navy's VFX (which was VFAX)[35] was not suitable as an F-4E replacement, nor could the F-4E be modified to meet performance requirements;

4) any F-15 ground attack capability would be a spin-off of its basic requirement of air-to-air combat capability.[36]

The preliminary estimate of the average unit flyaway cost[37], based on a production of almost 750 aircraft, was approximately $5 million, with a total programme cost estimate which included the development of a new engine and a new radar, slightly in excess of $5 billion. It should be emphasised again, that history has shown that cost estimates developed in the conceptual stage are usually optimistic and should be given little consideration to actual costs. Also, blame does not lie solely with the contractor but is shared by the DoD Components' over-enthusiasm while preparing their documents found within DODD 5000.1 discussed earlier.[38]

Thus far, the following points have emerged from the above discussions. First, although military aircraft are inherently complicated in themselves for the various tupes of missions required by such aircraft, ultimately costs are a major determinant.

What further complicates this environment are the contractors, very large private enterprises working with the Pentagon on design, mission need and requirements. Various strategies having been promulgated by these contractors to secure the contract complicated it further and a change in the international arena (Soviet introduction of MiG-25 (Foxbat)) or in the performance of aircraft (poor in Vietnam) inherently altered the strategies of contractors and mission requirements. The point is that there are many uncertainties in weapon systems development. However, as shown in the discussion of Fiscal Cycle overlap[39], some of the uncertainties can be narrowed down for the contractors whereby if contractor A realises he does not have his "foot in the door" compared to Contractor B, his (Contractor A) emphasis will shift toward upcoming awards. Taking this one step further, the uncertainties of the contractor are further narrowed by the DoD Components. For example, and discussed below, the risks are lessened by a prototype programme, between General Dynamics and Northrop, because the funding for it came from the DoD, instead of from the contractors. This was also evidenced by Northrop being "bailed out" after losing the competition to General Dynamics. The point is that although the acquisition of any weapon system is complicated, which results in risks and uncertainties, there are mechanisms to make certain that a large private contractor does not fold overnight due to loss of contract.

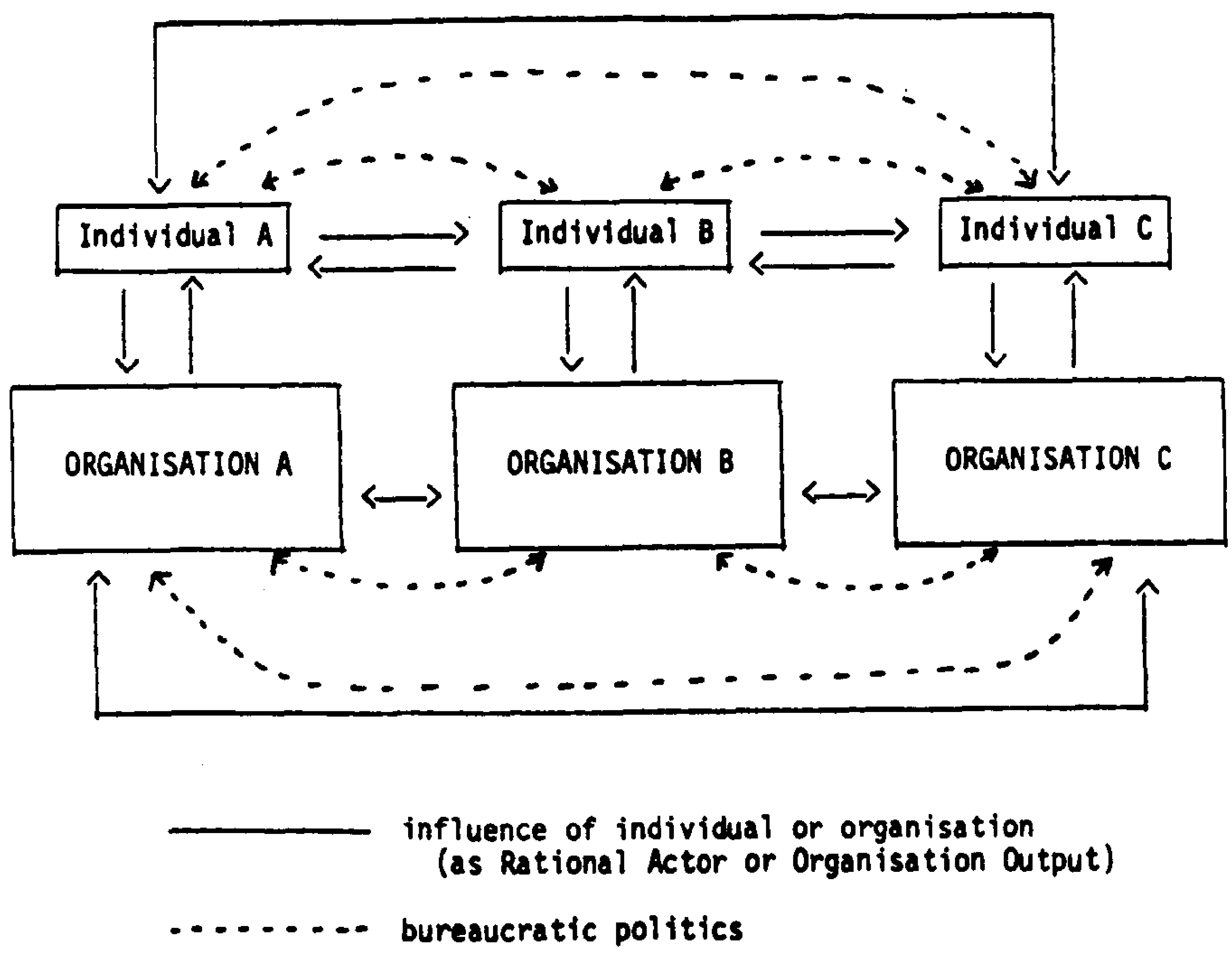
Second, although decisions radiate upwards, had there not been a SECDEF Robert McNamara, who conceived a new regime at the Pentagon through his

Cost Benefit Analysis, the Air Force may not have opted for the A-7 aircraft in November 1965. McNamara's budgeting techniques were to provide policy makers with a means of looking at total cost in money and man hours for any weapon system and to provide a "cost-efficiency" ratio for these programmes so that policy makers could decide whether the extra benefits they expected were worth the input when compared with the other means of accomplishing the same mission. Such techniques coloured his decision to opt for commonality, which made management sense, when working in an environment of rising costs. (Perhaps, whilst managing the overall DoD, he was exerting influences from his management skills received from previous experience). In the case of commonality for the F-X, an individual such as McNamara did matter as opposed to a Clifford or a Richardson in decision making. Although they had similarities in management skills and were essentially managers, the decision might have had a different outcome if it had not been measured along the merits of McNamara's Cost Benefit Analysis. If that were the case, the aircraft for 1975-1985 may well have been the F-15 and not the F-16. This thinking is contradictory to what has been set forth throughout regarding the lack of input of a SECDEF to the decisions of weapons procurement. The SECDEF does play a role in a wider managerial sense. For example, McNamara's reforms affected the outcome of decisions daily. However, regarding the decisions on a specific weapon system, the SECDEF is less involved than DoD Components. In essence, the SECDEF, as a manager of the DoD, is responsible for setting the parameters. Nevertheless, it is not necessarily true that items which he favours based on his policy decisions, or his personal persuasion (such as the commonality for fighter aircraft) always materialise.

Third, aside from the role of an individual, the influence of an office is an important determining factor. This has been evidenced in the correspondence between the Deputy Secretary of Defense and the private contractors. As stated earlier, the Secretary of Defense is busy not only managing the entire DoD, but is attentive to the politics involved and the political consequences of decisions. Responsibility often lies with the Deputy Secretary who must also delegate his authority and manage the many decisions making their way toward him. . For example, his office and eventually the SECDEF receive influences from the Office of the Secretary of Defense (OSD) for Systems Analysis as well as other DoD Components in the preparation of the Systems Concept Paper. An additional dimension in the culmination of the F-X project to consider is the personal influence applied by Pierre Sprey. While an individual may influence organisational output, in turn this influence may prove to be an input for bureaucratic output. Alternatively, an individual may be influenced by the organisation which may be an input to bureaucratic politics between two organisations. Thirdly, bureaucratic politics between organisations could be the precipitate of two or more individuals disagreeing on an organisational issue. The possible scenarios and permutations are infinite. Consider the following diagram :

Figure 5-I

Relationships of Individuals to Organisations



The diagram is based on the three categories of decision making illustrated by Graham Allison.[40] However, as stated earlier, Allison neglected in his original work to develop the point that organisational output (Systems Concept Paper) may act as an input to bureaucratic politics (for example, SECDEF aligned with the Navy, and Air Force versus Navy regarding the commonality issue; or the Navy versus the Air Force based on inter-service rivalry). Moreover in Allison's Rational Actor Model, he appeared to diminish the importance of the individual and how that individual might influence or act as an input to the bureaucratic politics model through organisational outputs or through himself. In essence, the above diagram presents a fuller picture of the relationships and when viewing decision making, the author is attempting to emphasise that a Pierre Sprey was just as important as a Robert McNamara, as was a DoD Component to the Office of the Secretary of Defense in the roles they played in a decision. During the non-hardware phase of a weapon system, Pierre Sprey (as an individual output) was more important than Robert McNamara, as a DoD Component (as an organisational output) was more important than the Office of the Secretary of Defense. If those at the top are busy with management and politics, it is those below feeding them the decisions which they manage as final arbitrators whilst considering the political consequences. If such is the case, then from the viewpoint of a weapons contractor, he is best knocking on doors with less brass during the non-hardware processes.

Fighter Mafia

With the approval of the Development Concept Paper, the Air Force was in effect off and almost running with a new fighter programme. However, prior to the approval of the Development Concept Paper, several aggressive and perhaps farsighted individuals in the Air Force and the Office of the Secretary of Defense had developed reservations regarding the F-X concept - particularly with respect to the potential for higher performance, smaller size and lower cost. The effect of the F-15 decision was to re-orient their efforts from trying to make that aircraft more austere, towards defining what the next Air Force fighter should look like.

The F-X Concept Formulation Studies were greatly aided by Colonel John Boyd (at that time Major), an Air Force pilot and engineer, who was summoned to the Pentagon in October 1966 to review the above mentioned heavyweight F-X design and, following that, was primarily responsible for the many trade-offs and analyses that led to the F-15. As a fighter pilot and tactics instructor at Nellis Air Force Base, Nevada, in the late 1950s, Boyd had developed several theories that, when applied to air combat manoeuvring tactics (dogfighting), assisted a pilot in gaining an advantage of position over an adversary. At Georgia Tech in 1962, he began to quantify and relate those aircraft characteristics which contributed most significantly to performance, namely : the aircraft's weight, drag, thrust and lift. Of course, these characteristics were well known to aircraft designers, but Boyd's unique connection of these variables directly to manoeuvreability was something new.[41]

At first, Boyd could hardly believe that this simple idea was a new method of looking at fighter performance. Once he had realised the fact, he confirmed how various combinations of aerodynamics and engines could be devised to create better aircraft. By looking at manoeuvreability from a different viewpoint, "manoeuvreability as an energy problem - when you manoeuvre an airplane you need energy ... you loose energy either in gaining altitude, airspeed or both. You loose energy in turning - what happens is that your drag exceeds your thrust, and at that point you have a negative energy rate". The negative rate has to come out of altitude, airspeed or out of a combination of the two. "You reach a point at which drag is greater than thrust - that means you have a negative vector ... you multiply net drag by velocity and that tells you how much energy you're going to have to pump up."[42]

In 1963, at Elgin Air Force Base, Florida, Boyd teamed with Thomas Christie, a mathematician, who recognised the potential of Boyd's emerging theories. Christie also had access to a computer which could be used to expand, refine and simplify them. The resulting "Energy Manoeuvreability Concept" shed new light on air combat tactics, and because it lent itself to computer analysis and synthesis of design trade-offs, proved to be valuable in the design of new aircraft. Boyd took his programmes and made them available to the aircraft industry's design engineers and provided criticisms of their design studies.[43]

Regarding the F-15, Boyd did have some reservations about the final F-15 design. Another person who doubted some of the design features was Pierre Sprey who, in late 1965, left Grumman Aircraft where he had been an operations research analyst and consultant to join the Office of the Assistant Secretary of Defense Systems Analysis (OASD/SA) staff as a weapon systems analyst. While there, Sprey and others were concerned over the increasing cost of weapon systems and the accompanying decline in the size of the major US forces. Sprey set out to determine what was causing this trend and, if possible, do something about it.[44]

In the Spring of 1967, Boyd briefed Sprey on F-X design trade-offs and the rationale for them. Sprey realised that Boyd's analyses were the key to rational fighter design. The association of these two, which in time attracted a following, became a kind of fraternity often referred to as the "Fighter Mafia". And it was the lobbying of this group as well as, "the lobbying of Boyd and Sprey for simpler more manoeuvreable weapons that made possible the development in the early 1970s of the F-16 fighter jet".[45] The primary motivation of the group was concern over force structure based on the premise that a greater number of small, very high performance fighters was preferable to a lesser number of larger, more complex, and therefore more costly fighters, with somewhat compromised performance levels. Although today there are almost infinite levels of weapon system complexity, the "Fighter Mafia's" conviction was that numbers were more important than complexity.

Sprey and Boyd were convinced that if the current cost escalation of fighters continued it would not be economically feasible for the US and NATO to retain numerical parity with the Warsaw Pact tactical fighter force. They believed that the way to reverse this cost trend and maintain parity was to omit all non-essential systems from the mission; refrain from the penchant for advanced technology engines; and eliminate requirements for complex avionics systems, which were high and seldom used militarily, regardless of top speeds and excessive ranges. Sprey also believed that since the implementation of policies inaugurated by SECDEF McNamara[46] (who, as SECDEF, was setting the parameters) the Services were now constrained to fixed force structures, rather than budgetary limits. It was clearly in each Service's interests to maximise the capability of each force unit; in other words, there was "no incentive to acquire larger numbers of weapons by reducing unit cost".[47] Thus, Sprey had not only recognised the need for greater austerity in fighter aircraft, but also the need for incentives that could be exploited to achieve it. Furthermore, Sprey realised that Boyd's analytical techniques could be used to determine if such an aircraft could be designed and still retain relevant combat performance.

Even though the Development Concept Paper, mentioned above, formed the design of the F-X requirements in late 1967, Boyd and Sprey with their data and trade-off techniques were still searching for a more austere fighter. They challenged almost every requirement of the F-X design and realised that extracting a little weight or complexity from each of many areas would result in large overall savings. They envisioned a smaller, less complex fighter, weighing about 33,000 to 35,000 pounds which would have improved performance in all areas except for top speed.[48]

In the Spring of 1968, Boyd briefed the Air Staff and Sprey briefed the Commander of the Air Force Structural Command of their findings. Some interest was expressed, but no serious attempt to increase the performance, and decrease the size of the F-X was undertaken.[49] The Fighter Mafia's battle for a more austere fighter seemed lost and they kept relatively quiet throughout the remainder of 1968.

The F-XX Concept

Sprey and Boyd used the trade-off data from their work on the F-X to challenge all specifications and requirements in order to determine the extent of performance improvement that could be achieved. Their efforts of technological research and developments altered the requirements which evolved into a single engined, less than 25,000 pound, fighter concept which Sprey dubbed the "F-XX".[50] Subsequently, Sprey provided the F-XX designs both to General Dynamics and Northrop for independent reviews. Primarily, Sprey selected these two contractors because General Dynamics had submitted smaller designs in the F-X concept formulation phase, and because of Northrop's efforts on their attractive new P-530 design.

The traditional USAF thinking equated light weight with short range. In retrospect, this was perfectly justified in view of the technology of the time. The MiG-21 was lightweight and developed by using mid-1950s technology which gave rise to the quip that it was a "supersonic sports plane". The MiG-21 had a very limited range and an even more limited payload.

A major breakthrough occurred in 1969. After receiving volumes of contractor design data, Sprey's 25,000 pound F-XX had stood the test of validity. The requirements he had set were as follows :

- Slightly more range than an F-4;
- no increases in weight or cost to achieve a ground attack capability or a top speed greater than Mach 1.6;

- 500 pounds of avionics including radar;
- subsonic turning performance equivalent to that of an F-86;
- structural specifications corresponding to the lowest used successfully on previous jet fighters;
- a maximised thrust-to-weight (T/W) ratio;
- stringent stability and pilot visibility criteria.[51]

Sprey's design studies demonstrated that by limiting requirements to only mission-essential equipment, increases of more than 100 percent could be achieved in both acceleration and maximum turning performance compared to the F-4. (Sprey at this stage purposely did not make comparisons to the F-15, apparently to avoid the issue of the F-X concept.) Thus, the relative costs were reduced by more than one-third, and their indications were that further reductions in avionics and equipment would result in still lower weights (as low as 17,000 pounds) and costs, with no loss in performance. As an incentive to incorporate his designs, Sprey also contemplated a major change in the acquisition process, whereby two contractors would each build two F-XX prototype aircraft for the Air Force and two <u>other</u> contractors would each build two VF-XX (Sprey's version of the Navy's VFX design mentioned above) prototypes for the Navy.[52] Also, he envisioned four competing engine contractors. (Perhaps Sprey's idea was derived from the Northrop prototype scheme for the P-530 Cobra in 1967). The finale of the competition was to be an aerial dogfight, without munitions, on the basis of which the two winning designs (one Air Force, one Navy) would be selected. Furthermore, he felt that if the programmes were managed using an approach of minimum documentation and manpower, the total development programme funding, including production start-up costs for the two aircraft and engines would be about half the combined F-14 (VFX) and F-15 (FX) development cost estimates.[53]

Regarding the notion of Sprey being more important than a McNamara, during the non-hardware stage, it was Sprey who contemplated this prototyping programme which, although not entirely accepted, was eventually accepted in another version. Regardless of whether the prototyping scheme is credited to Sprey or Northrop, "the addition of the 'fly-before-you-buy' concept was another innovation of the management of systems acquisition".[54] The importance of prototyping lies not so much in the concept itself, but in the fact that the DoD Components, or the contractors, can affect the overall management of the DoD. This indicates that the function of setting the parameters is not only the preserve of those in authority, for example, the SECDEF. One interpretation of the relationships between SECDEF and DoD Components, in the processes of decision making in weapons procurement, is the following: The DoD Components exert more influences in the approval or disapproval in the decisions of specific weapons systems. The influence of the SECDEF is an attempt to maintain that these decisions, and the processes pertaining to them, subscribe to the limitations or personal parameters imposed by a SECDEF. Nevertheless, even these influences are limited in their scope, in relation to those exerted by the DoD Components as witnessed in the outcome of the argument for commonality. Thus, the participation of the DoD Components within the jurisdiction of the SECDEF, is a further indication of their strength, relative to the SECDEF. Further, it was the DoD Components and contractors who altered the requirements for the F-XX and not decisions from above.

Also, prototyping altered the weapons system acquisition process, because much of the Research and Development which translated into hardware was done privately instead of at military research and development laboratories. It brought the Pentagon into even closer liaison with the contractors, and working alongside one another further cemented the two way street for technology developments.

In January 1969, the incoming Nixon Administration brought in Secretary of Defense Melvin Laird and Deputy Secretary of Defense David Packard to take over the reins of the Department of Defense. The F-15 progressed towards source selection although the austerity advocates had not conceded. Members of the Air Force Studies and Analysis had been working with Boyd's data and other trade-off results provided by contractors. Major General Glen Kent, who headed this organisation, decided these studies needed another chance to convince the Air Staff that a lighter and less complex F-15 would offer significant benefits. A mid-1969 briefing to this effect by Lieutenant Colonel Larry Welch was <u>not</u> supported at high levels and marked the last internal Air Force attempt to alter the F-15 design.[55]

At the same time, Boyd was transferred along with the entire F-15 office to Air Force Systems Command Headquarters. Sprey continued to update his F-XX concept as new data became available. His theories were beginning to gain additional support in the Office of Assistant Secretary of Defense Systems Analysis (OASD/SA) and in the staff of the Office of the Director, Defense Research and Engineering (O/DDR&E). The first of these two offices, Office of the Assistant Secretary of Defense Systems Analysis (where Pierre Sprey worked) has the responsibility of preparing the Systems Concept Paper for DSARC review.[56] The second office, the Office of the Director, Defense Research and Engineering, is the DoD Component which prepares the Decision Co-ordinating Paper.[57] Previously mentioned, the Decision Co-ordinating Paper (DCP) "defines the program and includes program objectives, program plans, performance parameters, areas of major risk, system alternatives, acquisition strategy, and special logistics problems."[58] This is also the document in which the contractors have the greatest input, in the earlier stages. "Industry is asked to submit proposals for engineering development and one or more contractors are selected for development".[59] The purpose of the DCP is "to verify that the technical and economic bases [POM review] for initiating a full-scale engineering development program are valid".[60] Moreover, the contractors will also be cognisant of the fiscal activities of this DoD Component, because the Office of the Director, Defense Research and Engineering also has the responsibility of preparing the draft Resource Planning Guide. This document is implemented into the Defense Guidance of the

Planning, Programming and Budgeting System (PPBS).[61] However, most important to remember is that this office, the head of which is now referred to as the Under Secretary for Defense, Research and Engineering, is also the Defense Acquisition Executive of DSARC.

In mid-1969, an Office of the Assistant Secretary of Defense Systems Analysis (OASD/SA) draft Presidential Memorandum on Tactical Air combined the suggestion that both the Air Force and the Navy should adopt the F-XX/VF-XX concept as a possible substitute for the F-15(F-X) and F-14(VFX) respectively; such action would provide each Service a doubling in force size. Both Services held their ground, arguing that so austere a fighter could neither defeat the high-speed, high-altitude Foxbat, nor carry the avionics needed to cope with enemy defences.[62] Moreover, both the Air Force and the Navy had surmounted many problems and were too close to realising their own fighter designs, and were not to be easily swayed by a new and unproven design concept which would threaten to start the whole process all over. Another reason for their reluctance was the apparently inflexible Congressional force structure policy which led the Services to pursue multi-purpose, and thus more complex and expensive, aircraft.[63]

Furthermore, the light weight claimed for the VF-XX, Navy analysts stated, was in fact unachievable and the proposed thrust-to-weight ratio and wing loading could only be attained in an aircraft weighing in excess of 50,000 pounds.[64]

The Services' hard line on the F-XX concept effectively emasculated the initiative of the Office of the Assistant Secretary of Defense, Systems Analysis. Nevertheless, the Office of the Director, Defense Research and Engineering would continue its research with contractors to eventually produce the Decision Co-ordinating Paper. In retrospect, it is clear that the "Fighter Mafia's" crusade for austerity at least forced the F-15 planners and designers to do additional research, producing a better fighter than they might otherwise have done. Moreover, it is reasonable to conjecture that, had this campaign for a more austere F-15 been successful, there might never have been a Lightweight Fighter.

F-15 Programme

In late 1969, Mr Packard directed the Air Force to review the F-15 programme requirements carefully with the objective of reducing both development and production costs. This was because some estimates of the F-15 costs exceeded the 1968 Decision Co-ordinating Paper, but additional pressure was due to the still growing ranks of austerity advocates. Following Air Force guidelines, the range, manoeuvreability and size of the aircraft were left intact, but avionics and ground attack provisions were reduced by lowering the per unit cost by approximately $1 million.

This behind them, the Air Force wanted to go into production as rapidly as possible but were realising that the "total package procurement" concept,[65] as used for the C-5 would be difficult, if not impossible, to get approved. On the other hand, the competitive prototyping had been waived in the Decision Co-ordinating Paper so that alternatives posed no problem for the Air Force. Stressing the urgent need for the F-15, the Air Force planned to apply the Total Package Procurement concept to the airframe, while using competitive prototyping for the higher risk systems - the new engine and radar. However, Congressional and public criticism aroused by the C-5 and F-111 cost overruns[66] caught up with the F-15 Programme and the Total Package Procurement Strategy had to be modified. A compromise was worked out which separated the development and production phases to a greater extent and held the contractor to specified demonstration milestones prior to obtaining additional funding. This approach reduced the possibility of criticism for concurrency and permitted the Air Force, as well as the Office of Secretary of Defense, to evaluate the aircraft more thoroughly prior to the approval and funding of serious productions - in a broad sense "fly-before-you-buy".

In December 1969, the Air Force selected McDonnell-Douglas as the F-15 prime contractor.[67] Sources for both the new afterburning turbo-fan engine and lookdown radar were to be determined from the prototype competition.[68] With the acquisition strategy resolved and the prime contractor selected, the Defense Systems Acquisition Review Council (DSARC)[69] convened on 19 December 1969 to review the F-15 programme. Following this meeting, the Office of the Secretary of Defense cleared the programme for engineering development - twenty aircraft for test and evaluation.[70] Obviously, this was cause for Air Force celebration and yet only a few foresaw the problems that still lay ahead for the F-15.

Nixon Doctrine

In 1969, one of the major implications of the Nixon Doctrine, which the new President proclaimed to increase pressure on America's allies, was for them to assume a greater share of the burden of their own defence. Such a modification of US foreign policy had repercussions on DoD's sales policy. This is an example of an external variable affecting DoD decision making. In October 1969, the Office of the Secretary of Defense advised the Services of the objectives and limitations that were expected to govern future military export sales. The new guidelines stated that :

- Sales proposals would be made only in response to a foreign secretary's initiative;
- only those items needed to meet valid military requirements would be sold;
- wherever practical, prospective buyers would be encouraged to purchase directly from US commercial sources rather than from the Department of Defense;
- however, the Department of Defense would assist US industry in making sales while avoiding all connotations of favouritism;
- items which the Department of Defense believed a country did not need, could not afford, or could obtain better elsewhere, would not be sold.[71]

For some time, the Office of the Secretary of Defense had been concerned over the erosion of the US competitive position in the international sale of aircraft. Aside from DoD's sales policy being affected, the new doctrine, under which the US would supply the weapons for defence, but not the men to operate them, provided the incentives for developing a fighter which would appeal to allies. In September 1969, Deputy Secretary of Defense Mr Packard, wrote Congress requesting approval for the Air Force to initiate development of a new "Free World Fighter" appropriate for allies. According to Mr Packard, he foresaw a need, over the next five to six years, for approximately 325 aircraft to support South Vietnam, South Korea, Taiwan and other allies.[72] The rationale was that it was in the best US economic, political and military interests to develop and produce a relatively inexpensive but modern defensive fighter-interceptor for these countries, thus enabling them to become nationally self-sufficient for their defence but, dependent for equipment. An aircraft purpose of this nature would also be attractive to other friendly countries, which would procure their defence needs elsewhere if they could not be met in the US.

In an October 1969 letter to Senator John Stennis, the Chairman of the Senate Armed Services Committee, from Secretary of Defense Melvin Laird, soliciting support for the International Fighter Aircraft (IFA) programme, Laird stated that "the fighter would have adequate capabilities to handle the existing threat, would be as inexpensive as feasible, and simple to maintain and operate".[73] With Nixon executing his Vietnamisation programme and Congress in a mood to accelerate the withdrawal of US forces from South East Asia, the expected approval and funding were rapidly obtained. Before the end of 1969, $58 million was earmarked by the Office of the Secretary of Defense for the International Fighter Aircraft development in Fiscal Year (FY) 1970 and 1971.[74] In the meantime, companies which had produced fighter aircraft were not only cognisant of these developments, but two of these companies (General Dynamics, Northrop) were working on their own version of an International Fighter Aircraft based upon the requirements as they perceived them, even though final specifications had not yet been determined. The approach was not too risky because these requirements changed and the contractors were in a position to influence that change.

The inherent problem of the International Fighter Aircraft programme was that although the capabilities of the aircraft (however austere and suitable for less developed allies), would be designed for foreign needs, which could possibly force the Air Force to inventory it, so as to enhance its sales abroad. The rationale was that if the Air Force did not include it, why should another nation, who might reason that if it was not good enough for Uncle Sam, then it was not for them either.[75] Thus a clash of capabilities versus foreign sales ensued. The parameters of the capabilities were determined by the policy directions which stated that the International Fighter Aircraft was <u>not</u> to provide a capability to launch independent, aggressive actions against neighbouring countries - in other words a "completely" defensive aircraft was intended.[76]

Along these lines, Deputy Secretary of Defense Packard approved the Air Force's IFA Programme and Requests for Proposals (RFPs) were released to the aircraft industry in February 1970. The Request for Proposals specified an aircraft capable of a 100 mile radius of action on three missions : counter-air, point intercept and close-air-support. The Request for Proposals further stated that the new weapon system be tailored and produced essentially from existing or "off-the-shelf" hardware and be operational by 1974; contract award was to be made before the end of 1970.[77]

The RFP came as somewhat of a shock to the contractors, especially those already working on their own versions, because most soon realised that even after removing all uncalled for equipment and systems, their International Fighter Aircraft candidates possessed inherent offensive capabilities well in excess of the RFP. A few of the would-be competitors were thus eliminated whilst others sought additional ways of reducing the offensive potential of their designs.[78]

New Fighter Mafia Advocates

Meanwhile, the "Fighter Mafia" had gained a new Air Force member - Colonel Everest Riccioni, a fighter tactician, test pilot and graduate astronautics engineer, who had been assigned to the Tactical Fighter Requirements Division of Air Force Headquarters in May 1969. Riccioni originally believed that a smaller, less expensive fighter could be produced only by sacrificing performance until he became aware of the studies by Boyd and Sprey. In January 1970, Riccioni took over the Development Planning Section where more opportunities to pursue his ideas were available. Convinced by Boyd and Sprey and also Chuck Meyers (a former test pilot and then an independent aerospace consultant) that a small, less expensive fighter could match or even improve upon the performance of larger fighters in most flight regimes, he began to contemplate fighters even more austere than those advocated by Boyd or Sprey.[79]

Moreover, Riccioni teamed with Boyd and Sprey to determine methods that might improve fighter design requirements. After several discussions with the Air Force and industry designers[80] it was agreed that design mission rules should be more task oriented.[81] By means of these discussions which weighed research and information, General Dynamics and Northrop had managed to begin to alter the requirements of the original Requests for Proposals. This is further evidence of the collegial relationship of industry and the DoD Components. Moreover, this relationship, perpetually in motion in research and development, has its effect in amending documents for DSARC review, for example, the Decision Co-ordinating Paper.

Also, Riccioni, in the summer of 1970, became aware that the Navy had critics of the F-14 as the Air Force did of the F-15. He began to wonder if the Navy might be pursuing a more austere fighter than the F-14, in other words, was there a mirror image of the Air Force's "Fighter Mafia" to be found in the Navy? Through his enquiries, Riccioni suspected that the Navy had been working on at least three such designs with contractor assistance.[82] This was a reason to step up research on the lightweight fighter. The Air Force could not gamble on the notion that if the F-15 failed, then there would be the threat of the Air Force having to adapt yet another Navy fighter design.

Problems for DoD Procurements

During the summer of 1970, critics of the Department of Defense's weapon systems acquisitions within the Congress and the media became more vocal and aggressive. As cost schedule and technical problems seemingly increased in programme after programme,[83] several study reports charged that the "entire DoD-contractor weapons systems acquisition process was out of control".[84] An outcome of these criticisms was the President's Blue Ribbon Panel Report in July 1970,[85] which substantiated the conclusions of several earlier studies and made a number of recommendations for improving the acquisition process.

Two months earlier, in May 1970, anticipating the Blue Ribbon Panel Report, Mr Packard had released a Department of Defense policy memorandum[86] on major weapon systems acquisition. The emphasis of the memorandum was to enable the Services to improve their own management of programmes, whereby the memorandum provided broad guidance in areas of management, development, production and contracting. Mr Packard decentralised the procurement system by permitting the various services to manage their programmes as long as they adhered to the overall Department of Defense guidelines. Mr Packard directed that the new policies be implemented immediately and that pertinent DoD regulations be changed or cancelled by September 1970. This event delegated authority downwards due to not only the increase in size of the Department of Defense and the number of weapon systems, but also the high levels attained in modern weaponry and the expertise required. Whatever the reason, it substantiates the point that subordinates invariably will feed their decisions upwards based on their technical expertise to prove the judgments to be sound.

One of the many recommendations of the President's Blue Ribbon Panel Report in July 1970 was the formulation of a new weapon system development policy that would reduce technical risks by demonstrating hardware before it entered engineering development - Prototyping - thereby providing the needed flexibility in decisions of acquisition strategies. In addition, the Report recommended the abandoning of Secretary of Defense McNamara's concept of Total Package Procurement for "more use of competitive prototyping and less reliance on paper studies".[87]

In 1971, Boyd was working for the Air Force Prototype Study Group. Consequently, he was in the position to view the concept at a time when the idea of competitive flight-testing of prototype designs was returning to vogue after the highly controversial Total Procurement Package contracts of the 1960s which had resulted in the F-111 and C-5 Galaxy.

Prototyping Looks East - Europe

In early 1971, Lockheed initiated the prototype competition on 14 January by proposing its prototype design, the CL-1200 (also called the Lancer). Northrop immediately followed on 31 January with its P-530 Cobra. Boeing followed in February and Ling-Temco-Vought (LTV) in June.[88] The prime motivation for this flood of "unsolicited" proposals was not the Air Force's diet of evaluating new weapon systems. The reasons suggested for the submission of these proposals were, first, the interest that was being generated by Riccioni's Boyd's and Sprey's studies. Second, there would be fear that the F-15 and A-X programmes would monopolise the Air Force's tactical aircraft budget for the next ten years. And, third, presuming the validity of the second point, then it would be in the best interest to have a demonstration fighter to market in Europe where the next major fighter procurements were expected to occur.

At this time, the number of participants for the Multi-Role Combat Aircraft (MRCA) programme had dwindled to three - Britain, Germany and Italy. The programme was in trouble. The three remaining sponsors were learning that designing an aircraft for a broad spectrum of combat missions can be very expensive, as the Air Force had similarly learned with the F-111. The British requirement for a long-range interdiction strike aircraft would detract from the air superiority capability desired by Germany and Italy. Most importantly, though, the engine contractor for the Multi-Role Combat Aircraft (MRCA) - Rolls Royce - not only had exceeded development cost estimates by fifty percent, but, was in receivership. It was apparent that the MRCA programme would not dominate the European fighter scene and therefore the four American companies, Lockheed, Northrop, Boeing and LTV, were anxious for a piece of the action. If the MRCA should fail, Germany offered the largest potential market. However, Germany had been planning to make an interim purchase of approximately 150 McDonnell-Douglas F-4E/Fs[89] which were intended to complement the MRCA when it eventually entered service. The Germans were delaying this procurement decision which, in early 1971, aroused a flurry of speculation. In addition, the Germans were waiting for the conclusion of US-FRG forces negotiations in June. A rumour purported that the Germans were trying to coax the Dutch into joining them in the F-4 buy. Others, also rumoured the existence of a Luftwaffe "Fighter Mafia" advocating abandonment of the MRCA in favour of the P-530 (Northrop) or CL-1200 (Lockheed). Whatever the reason, the significant point is that both Lockheed and Northrop decided that the Dutch selection, of their own future fighter, might influence the German selection. Thus, both companies saw the Netherlands as the key.[90]

At the time, the Dutch were evaluating the Dassault Mirage F-1, Lockheed CL-1200, LTV V-1000, McDonnell-Douglas F4E/F, Northrop P-530 Cobra and the Swedish AJ-37 Viggen. The decision of the Dutch was expected in late 1971. Of the American candidates, the Dutch knew little of the

LTV-V-1000; and the McDonnell-Douglas F-4E/F was considered too large for Dutch needs and too expensive to operate and maintain. Moreover, the Dutch expected the Germans to buy the F-4 and eventually they did as an interim purchase to the MRCA in June 1971. On the one hand, McDonnell-Douglas would be busy producing the F-4s and on the other hand LTV was out of the picture. Thus, the companies were narrowed down to two: Lockheed and Northrop and both knew that getting a prototype performance demonstration into the air might be the decisive factor. With such substantial commitments and with the Air Force providing the engines on loan to the programme, Lockheed envisioned its researching and testing cost of two prototypes to be $30 million.[91]

In a letter from Mr Johnson of Lockheed to the Secretary of the Air Force, Lockheed cited the possible benefits for the Air Force.[92] The benefits cited were :

- test data on a fighter configuration capable of countering the projected threat;
- a performance evaluation of an aircraft which could be produced at roughly <u>one-half</u> the cost of the F-15 and could out-perform the new Mirage models.[93]

The letter further stated that the CL-1200 would be an excellent complement to the F-15 and might be available more quickly than expected. Also, the CL-1200 could be produced both in the US for US Air Force and in Europe as an interim fighter until the Multi-Role Combat Aircraft (MRCA) entered service.[94]

Obviously, such a proposal would create, and did, a furore in the Air Force and in the Office of the Secretary of Defense. Teams within the Office were quickly assembled to evaluate the proposal. At a quick glance, one Air Force assessment saw some advantages in the Lockheed offer :

- another contemporary fighter for the 1970s at a reduced development cost;
- a second production source in the event of a crisis;
- a potential foreign sales candidate that would compete with the Mirage;
- and another step forward in giving credence to prototyping.[95]

However, the arguments against it ranged from it being a potential threat to the F-15 along with no room for a new fighter in the already constrained force structure, to the political and industrial repercussions of a sole source prototype programme (as demonstrated by the problems of the C-5). Although these objections were raised, the central objection in the Air Force was the potential threat to the F-15 itself. Lockheed's comparison of the CL-1200 and F-15 costs and availability evoked hostility simply because, if the CL-1200 were successfully demonstrated before the F-15, critics of the F-15 would have the necessary clout to push for cancellation or curtailment of the F-15 programme. Thus a contractor and the DoD Components or a Service, which normally have a close working relationship, clashed. A given Service or DoD Component desirous to retain what it has already accomplished (ultimately to retain its mission from the infringement of other

Services) risks this special relationship with that contractor. Perhaps this was a reason as to why Lockheed was not chosen for the prototyping of the F-16. Another example of this was the Air Force having neglected Northrop's F-20 which threatened the F-16.[96] Nevertheless, the Air Force felt there were benefits in Lockheed's innovative means for testing development hardware (contributions from Germany, Netherlands and US companies) and in late February 1971, they decided to explore both the availability of US rather than European F-104 fighter aircraft and the strength of the commitments made to Lockheed by the supporting US companies. At this time, on 31 January 1971, Thomas Jones, Chairman and President of Northrop, informed General John Ryan, Air Force Chief of Staff, by letter that Northrop was offering two pre-production P-530 (Cobra) aircraft.[97] In this letter, Thomas Jones offered the two P-530s to the Air Force for $15 million if the Dutch made the $100 million commitment required to initiate the P-530 pre-production programme.[98]

Aside from Lockheed and Northrop setting the stage, other aircraft industry representatives with their concepts, design ideas and potential prototype programme proposals were making their rounds within the corridors of the Pentagon. Ling-Temco-Vought (LTV) representatives came to Washington to explore the possibilities of prototyping a two-seat version of their A-7 and also a new version of their V-1000 (powered by the Pratt and Whitney (P&W) F-100 engine) which had been designated the Super V-1000. General Dynamics (GD) representatives also had several meetings regarding their ongoing design evaluations with interested Air Force personnel and personnel within the Office of the Secretary of Defense.[99] However, because of General Dynamics' somewhat tarnished F-111 image, the suggestion is that they (GD) would have been reluctant to announce any proposals until their designs were firmly supported by wind tunnel testing and analysis.

Meanwhile, Boyd and Riccioni visited all the contractors working on Riccioni's study. At General Dynamics, it was apparent that top management was merely providing token support for the effort.[100] So, Boyd set out to impress them with the viability of Riccioni's concept which resulted in a significant increase in support for the General Dynamics design effort.

In February 1971, Boeing became the third contractor to submit their proposal. Following the cool reception by the Air Force of the two French Mirage proposals in late 1970, Dassault and Boeing had made contact. Boeing's plan was to prototype a Mirage F-1 with the General Electric J-79-19 engine for $8 million. This warmed the Air Force because the engine modifications (to the Mirage F-1) were to be done in the US; and to lessen the cost of the prototype, Boeing proposed only to build one and not two, as the others. Boeing requested that the Air Force pilots and technicians first evaluate the F-1 in France, and should this evaluation be favourable, a more formal proposal would be forthcoming.

Although the Air Force was interested in Dassault, they were less than enthusiastic about the Boeing proposal, since the F-1, even with the J-79-19 engine, offered no great improvements over the F-4. Moreover, support from the Department of Defense might be used by the French to enhance F-1 sales. Shortly thereafter, Boyd and Riccioni managed to convince Boeing to abandon any further effort on the F-1 and concentrate on developing its own new fighter design.[101] Boeing was behind in the race.

Department of Defense Interest Increases

The then Deputy Secretary of Defense, David Packard, saw the concept of competitive prototyping as a method of reversing the ever growing cost of new weapon systems. On 12 February 1971 in a memorandum to Deputy Secretary of Defense, David Packard, Dr John Foster Jr (Director of Defense Research and Engineering (DDR&E)[102] of the Department of Defense) responded to the industry proposals by indicating that more prototype work should be directed towards the realistic needs of the Department of Defense.[103] Dr Foster cited the numerous proposals that had been received and suggested that the Department of Defense might be well advised to fund the prototyping endeavours after sorting out both the proposals and the military needs. He proposed to initiate an in-house tactical fighter and strike aircraft study to place the many variables into a proper perspective. This study would permit a better look at the potential usefulness of the proposed prototypes, and, if they performed as expected, it would allow the Department of Defense to make sound decisions for future expenditure of funds.[104] Packard approved Foster's plan on 16 February. Members of Foster's staff, within the Office of the Director, Defense Research and Engineering, led by the Assistant Director for Air Warfare, Allan Simon,drew up a plan for a "Fighter/Attack Aircraft Prototype Study" and the Air Force began to consider the prototype proposals even more seriously. The purposes of the Simon Study, as it became known, were to determine the validity for prototyping, examine the capabilities of the candidates and, if appropriate, propose programme guidelines. Moreover, the study was to determine how often the programme of evaluating technology and designs not included in current Air Force programmes were to be initiated, and set the general parameters of associated costs.[105]

Concurrently with the initiation of the Simon Study, the Air Force whilst cautiously pursuing the Lockheed proposal, was seeking additional information from Kelly Johnson of Lockheed. By the end of February 1971, more was known of Kelly Johnson's plan, and concern had developed. The US had no F-104s and the Air Force was reluctant to accept two aircraft from the allies, at no cost, which aroused suspicions that strings might be attached. Furthermore, the eighteen months programme would provide only a six-month flight evaluation - three for Lockheed, three for the Air Force. Lockheed then wanted the two prototypes returned so they could be used as demonstrators (presumably for the Dutch and Germans).[106] Objections were that the flight testing period was too short; that after spending at least $30 million, the Air Force would have no hardware in hand. Also, some in the Air Force were of the persuasion that if the Air Force tested and returned ...

the aircraft it would open the door to charges of the Air Force assisting Lockheed in foreign sales. Other obvious internal Air Force questions were - why another fighter? Why a sole source programme? What would be told to Congress? How could Lockheed absorb possible cost overruns?

Nevertheless, the Air Force considered the opportunity to obtain two high performance prototypes warranted further investigation because of their potential research value and modest cost. In early March 1971, Kelly Johnson of Lockheed reluctantly agreed to modify his proposal. The Air Force would own the two prototypes after the flight evaluations and the programme would be more research-oriented.[107] The Lockheed aircraft was assigned the experimental type and model designation of X-27 rather than "F" (for fighter) or "YF" (for prototype fighter). This implied a research orientation in line with the Air Force position - the X-27 would not be competitive with either the F-15 or F-5E, nor was it being considered for inclusion in the force structure. It was purely a research vehicle.

The Rush to Prototype

In April 1971, the Simon Study recommended that a comprehensive prototyping programme and a plan to manage it be established. Deputy Secretary Packard advised the Services that he contemplated $100 million to $200 million would be available for such an effort. These research and development funds are available at the SECDEF's discretion. Obviously, the Air Force which had been actively participating in the Simon Study was in a position to pursue these funds more vigorously than the other Services - and followed through. Moreover, to avoid any slowdown of the programme which might result from multiple agency involvement, the Air Force was in the process of developing a prototype plan of its own including the identification of specific programmes and establishment of ground rules. This point was outlined to Mr Packard by the Secretary of the Air Force, Mr Robert C Seamans, in a Memorandum on 7 May 1971,[108] which also stated that the Air Force would brief him on programme plans by the end of July. Packard, who by now was a strong and vocal advocate, approved the idea the next day and urged that the planning be expedited. Mr Packard said, "We ought to get one or two programmes going in FY 1972".[109]

News of major DoD memoranda/decisions spreads quickly to interested parties - thus, reports of Packard's sense of urgency to establish one or more prototype programmes in FY 1972 spurred industry efforts. Also, in the same month of May, draft copies of the new Department of Defense Directive 5000.1 entitled "Acquisition of Major Defense Systems" were available, although it was not formally released until 13 July 1971.[110] This Directive, one of several implementing Packard's broad policy memorandum of May 1970, stressed the need for conducting advanced technology efforts which would be independent of approved defence systems development. Mr Packard had opened Pandora's box. His memorandum stated that the "advanced technology effort includes prototyping preferably using small, efficient design teams and a minimum amount of documentation. The objective is to obtain significant advances in technology at minimum cost".[111] The Aircraft industry would now find it easy to ascertain what lay ahead and, coupled with Packard's sense of urgency, a strategy of providing the Pentagon with design concepts immediately would be assumed.

Ling-Temco-Vought pursued that strategy and were the first to respond. Ling-Temco-Vought sent a letter on 28 June 1971 to the Deputy Secretary of Defense Packard outlining a formal proposal of a programme for two V-1000 lightweight fighter prototypes.[112] Moreover, representatives of General Dynamics and Boeing also visited the Pentagon in June to discuss their evolving lightweight fighter designs; although neither company had submitted a proposal, they were preparing the information necessary to do so. Northrop also submitted their proposal. However, their proposal outlined two designs : the twin engine P-530 Cobra and a new design - the single engine P-610 which was comparatively similar to General Dynamics' and Boeing's design incorporating the single Pratt and Whitney F100 engine.

The Air Force Prototype Study

In late May 1971, the prototype programme was expanded to become the Air Force Prototype Study Group with additional participation from Air Force headquarters. The job was to review and recommend candidate projects, generate a supporting rationale, and identify management and procurement approaches appropriate for prototype development programmes. The working group to review and select candidates for prototype development was headed by Colonel Lyle Cameron, and his assistant was Colonel John Boyd.[113] New management procedures would be necessary. These included small Air Force programme offices with direct participation in the contractor's programme and a minimum use of formal procedures and/or specifications. "Streamlined procurement procedures are to be proposed ...".[114]

On 5 August 1971, the Air Force Study Group presented its findings to Mr Packard and only twenty days later (25 August 1971), Mr Packard approved the Program Decision Memorandum outlining the Air Force plans and funding for the Lightweight Fighter. In this particular case, due to the time constraints imposed by the Fiscal Cycle in its latter stages for FY 1972, the Program Decision Memorandum for the prototype study was a Supplemental PDM.[115] Furthermore, only two days after the Program Decision Memorandum was approved, the Air Force Prototype Program Office was established.[116] Needless to say, the Deputy Secretary of Defense Packard was a supporter of the programme.

During October and November 1971, as the Congress debated the FY 1972 Appropriations Bill, the Air Force (especially in the Air Force Prototype Program Office) was busy preparing the documentation for a Justification of Major Systems New Start. Obviously, considering the sensitive issue of the F-15, these documents had to be carefully conceived. Early in November, more pressures were exerted by a Memorandum from Dr Foster to the Air Force that Deputy Secretary of Defense Packard desired to commence the FY 1972 prototype programmes as soon as the Appropriations Bill was released by Congress.[117] To accommodate this decision, the Office of the Secretary of Defense would require the Air Force to submit a Program Memorandum, which would include a programme description, a milestone schedule, a funding profile, and identification of those questions and issues to be resolved by the test programme. These documents were requested within ten days! The Air Force, anticipating such urgency, and the DoD Components' constant appraisal of a programme, submitted it on 17 November 1971 - two days after having received the Memo.[118]

As the Air Force and the Office of the Secretary of Defense sought resolution of the Program Memorandum, the Senate Armed Services Committee was holding hearings on the weapons systems acquisition process. One of the several witnesses to appear was Pierre Sprey, who by now, had left the Office of the Assistant Secretary for Systems Analysis for private industry. In his testimony, Sprey addressed the problem of the increase in weapons cost, more commonly known within DoD as "gold-plating". Sprey charged that the military specifications and procurement methods had driven avionics costs up by a factor of ten over commercial versions; that the significant increase to airframe and engine costs was due primarily to the "zeal to achieve the last one or two percent of possible performance ... and that these last few percentages of improvements [to match specifications] were enormously more costly than the preceding ninety-eight or ninety-nine percent".[119] Sprey also explained the F-XX concept in some detail and, in comparing it with the current lightweight fighter designs, stated that the concept had progressed well beyond anything he had envisioned in 1968.[120]

Upon the completion of his prepared statement, Sprey received some favourable comments from Senator Goldwater. However, he came under considerable scrutiny from Senators Symington and Cannon. Essentially, Senator Symington appeared to doubt Sprey's credibility because he was not a licensed pilot. On the other hand, Senator Cannon quoted portions of the Navy's 1969 analysis of the F-XX concept. The debate, which became heated at times, involved Sprey defending his concepts and trying to avoid F-14/F-15 issues while Senator Cannon attacked by questioning the capability of a lightweight fighter to "do the job that may be required". He cited the example of "the experience in Southeast Asia with our own lightweight fighter ... the F-104", which had to be withdrawn because it "could not exist in the sophisticiated environment". Near the end of this hearing, Senator Goldwater asked Sprey if he thought that the aims of the proposed lightweight fighter programme were within the line of the F-XX study. When Sprey responded affirmatively, Senator Goldwater's concluding remarks were :

> "I don't ask that, Mr Chairman, to downgrade any of the testimony offered, but I think part of our trouble lies in some of these career civilians and men in uniform who just can't see anything valuable in a new idea; and I have seen some pretty good ideas shot down by these same people who would, I think, live to regret the thought that they had ever spoken against advancement. That is all I have."[121]

Only six days later, on 14 December 1971, the FY 1972 Appropriations Bill was released and $12 million was approved by the SECDEF for the initiation of a prototype lightweight fighter aircraft. The tasks to implement the programme were rapidly accomplished. On 20 December 1971, the Assistant Secretary for Research and Development, Grant Hansen, approved the procurement actions; Dr John Foster, Department of Defense, Research and ~~Evaluation~~ Engineering, approved the Program Memorandum on 27 December; and Acting Air Force Secretary, John McLucas, authorised release of the model contract to the industry on 32 December 1971.[122] Conveniently, 1972 would be a new year and new developments in research of the F-XX would begin to materialise in the form of hardware.

At the outset, there had been little if any involvement of the SECDEF in the conception of the F-16. McNamara did apply pressure for commonality, however, no such fighter aircraft exists in the USAF's or Navy's inventory today. In the case of commonality, the SECDEF's weakness may have been attributed to inter-service rivalry. Nevertheless, inter-service rivalry will remain and the contractors, (and the rivalry between them referred to as competition), further hampers the SECDEF in his ability to effectively influence decisions. This is accomplished by the contractors in an indirect way, for example, by taking advantage of the rivalry between Services, or in a more direct and participating manner.

Evidenced earlier, contractors maintain a close working relationship with the DoD Components in the researching of new technologies. Technology itself is a reason for the further decentralisation within DoD (Packard's memo, Blue Ribbon Report), but other dimensions are implicated. If, as in the case of the F-16, the weapon requires a high level of technology, the DoD Components will be pressured to continuously alter their requirements. The Services or DoD Components' requirements are detailed in differing manners, in a variety of documents, which further adds to the complications. But most significant for the SECDEF from a Service's viewpoint is the Decision Co-ordinating Paper (DCP) because ultimately it is the contract between the SECDEF and the Service. Further complicating this is the preparation of the DCP by the Office of the Director, Defense Research and Engineering (ODDR&E) whose responsibility it is to monitor and research all new technologies and engineering developments, thus placing them (ODDR&E) in the position of working directly with contractors. The other significance of this office is that the Director (presently referred to as Under Secretary) is the Defense Acquisition Executive of DSARC. Thus contractors researching new technologies, which are monitored by this office, have a direct line into DSARC. If during the matching of new technologies and research with requirements is altering a Service's needs, then it would be reasonable to assume that the DCP would have to be amended to reflect those changes. In the case of the F-16, as of January 1977, the "Air Force had prepared three drafts of the DCP for the F-16 program".[123] At the time, a GAO Report stated that the draft, "dated 18 May 1976, is being reviewed by the Office of the Secretary of Defense. Although an F-16 DCP has <u>not</u> [emphasis added] been signed, the draft version is used as a source document for program management".[124] The GAO Report which is dated 9 April 1977, stated that regardless of the status of the DCP, they still expected the decision for Full Scale Production in September.[125]

The weaknesses of the SECDEF set forth throughout, should not always be translated to mean that the strengths lie in organisations. The importance of advocates in the "Fighter Mafia" or Dr John Foster, David Packard, tell another story. The offices they worked in were prestigious. (Sprey in Office of the Assistant Secretary of Defense, Systems Analysis, Foster in DDR&E), but their personal or combined inputs, as evidenced thus far, were crucial for the development of the F-16. Further, other influences were exerted by the contractors upon them and vice versa. Regardless though, apparently very little pressure was dictated from above in these decisions. Whether or not this is similar in the next stage of development will now be the focus.

N O T E S

1. "NATO's Fifteen Nations", December 1974-January 1975, p.37.

2. In 1951, 6,300 fighter planes were funded by the military at a cost in 1983 dollars of $7 billion. In 1983, the US spent $11 billion to build only 322 planes, 95% fewer than in 1951. SPINNEY, F, "The Plans/Reality Mismatch", a sequel to the 1980 Spinney Report, Defense Facts of Life, as printed in, ISAACSON, W, "Are Billions Being Wasted?", Time Magazine, 7 March 1983, p.12. Two of Spinney's former mentors in the Pentagon bureaucracy were Air Force Col. John Boyd and Research Scientist Pierre Sprey - members of the "Fighter Mafia".

3. COOPER, B, "Fighter Aircraft Program", Congressional Research Service, Washington DC, 21 January 1983, p.1.

4. "Modern Fighting Aircraft - F-16", Aviation Fact File, London, 1981, p.3.

5. Ibid, p.4.

6. Examples of Problems with the F-111 :

   (1) The entire Mark II Avionics System was required by contract measured by Mean Time Between Failure (MTBF) to be 57 hours - its performance was 13 hours;

   (2) The integrated display set - a component of the Mark II Avionics System, was reduced from 270 hours by contract to 25 hours MTBF;

   (3) The "Doppler Radar" system demonstrated its contract specifications of 475 hours MTBF during General Dynamics testing in July 1970 - however, in reality, attained only a MTBF of 120 hours.

   See, "F-111 Aircraft", Staff Study, Department of the US Air Force, Unclassified, February 1973.

7. The Starfighter was a single engined tactical fighter and interceptor and also a lightweight (17,000 pounds). For purposes of comparison :

Very Lightweight	- less than 15,000 pounds
Lightweight	- 15,000-25,000 pounds
Medium weight	- 25,000-35,000 pounds
Medium heavy weight	- 35,000-50,000 pounds
Heavyweight	- greater than 50,000 pounds

8. Even though the F-104 was phased out of the US active inventory in the mid-1960s, the Air Force still continued providing flight and maintenance training to foreign students. See, GUNSTON, B, "A Tale of Aircraft Procurement : F-104G to F-16", Interavia, Vol.3, 1974, pp.25-30.

9. The Air Force supervised and participated in the development, testing and production of the F-5 and approximately 1,100 were delivered to 15 countries over an 8-year period. As with the F-104, the Air Force provided F-5 support and training to allies even though the F-5 was not in the active Air Force inventory. Ibid, p.26.

10. In their Reports, Lockheed projected that they would be competing in a Free World jet fighter market (excluding the US, Britain, France and Sweden) of approximately 4,000 aircraft. Northrop's projections were similar. See, GENTRY, J, "Evaluation of the F-16 Fighter", Industrial College of the Armed Forces, Report No. 76-163, Unclassified, 1976, p.7.

11. LINCOLN, (Maj) J, Trends in Weapon Systems Acquisition Process", United States Army, Military Review, August 1971, p.41.

12. "F-111 Aircraft", Department of the Air Force, Staff Study, Unclassified, February 1973, p.5.

13. Even though the Mirage III lost to Lockheed, it subsequently became one of the most important aircraft programmes in Europe. Approximately 700 of these medium weight fighters were produced for 10 countries through 1968. Production was also accomplished under licence in Switzerland and Australia. The capabilities of the Mirage III were demonstrated by Israeli pilots in the "Six Day War" of June 1967. See, DORFER, I, "Arms Deal - The Selling of the F-16", Praeger, New York, 1983.

14. Mr Kelly Johnson, noted Lockheed designer, centred his refinements for the F-104 around a larger wing and a series of more powerful engines (A 1969 design with a large wing mounted high on the fuselage and low mounted horizontal tail-weight 26,000 pounds). Such modifications to improve the speed and manoeuvring

performance of the F-104 were also intended to forestall some of the criticisms that had plagued the F-104. See, GUNSTON, B, "A Tale of Aircraft Procurement", op.cit, p.28.

15. HOLZ, R, "A NATO Milestone", Aviation Week and Space Technology, 25 October 1976, p.7.

16. For insights into NATO's Rationality, Standardisation and Interoperability of weapon systems, See, EDMONDS, M, "International Arms Procurements, New Directions", Pergammon Press, New York, 1981.

17. "The Best Buy for NATO Air Forces", The Economist, Vol.254, 11 January 1975, p.17.

18. The Northrop P-530 underwent substantial design changes throughout its evolution. That is why there are 5 versions of the P-530, namely P-530-1 through P-530-5. Lockheed's "CL" design also experienced a similar design series. See, GENTRY, J, "Evolution of the F-16 Fighter", op.cit., p.7.

19. 1970 US dollars, See, GUNSTON, B, "A Tale of Aircraft Procurement", op.cit., p.27.

20. Suffice it to say for now : initial unit pricing of weaponry is always optimistic, not only from the DoD Components but from the contractors as well.

21. Representatives of both Lockheed and Northrop had been tempting their potential overseas customers with their respective designs as they were evolving. Lockheed won the draw because Belgium had selected the French Mirage 5 in 1966 over the Northrop F-5 (the P-530 Cobra was not considered) and the Lockheed CL-985B as a replacement for its aged Republic F-84s. See, GENTRY, J, "Evolution of the F-16 Fighter", op.cit., p.9.

22. NITZE, P, Deputy Secretary of Defense, letter to Mr T V Jones, Northrop Corporation, 23 August 1968.

23. For a discussion of Defense Resources Board, See pp.72-75.

24. HEAD, R, "Doctrinal Innovation and the A-7 Attack Aircraft Decisions", American Defense Policy, 4th Edition, 1977, p.417.

25. _Idem_.

26. For a further discussion on the Systems Concept Paper, _See_, p. 186.

27. _See_, discussion re : F-16 versus F/A-18, pp.316-322.

28. HEAD, R, _"Doctrinal Innovation and the A7 Attack Aircraft Decisions"_, _op.cit._, p.420.

29. Tactical Air Command had for two years previously been issuing requirements documentation for a new air superiority fighter to the aircraft industries. For a discussion of the Research and Technology Work Unit Summary and Research and Development Planning Summary, _See_, pp. GENTRY, J, _"Evolution of F-16 Fighter"_, _op. cit._, p.11.

30. _Idem_.

31. Blue Ribbon Defense Panel Report, Report to the President and the Secretary of Defense on the Department of Defense by the Blue Ribbon Defense Panel, Washington, DC, July 1970, p.68.

32. COULAM, R, _"Inter-Service Weapons Rivalry"_, Bulletin of the Atomic Scientist, Vol.33, June 1977, p.26.

33. _Idem_.

34. A Decision Co-ordinating Paper (referred to as a Developmental Concept Paper) is a principal decision-making instrument in establishing a new programme, which is prepared by the Office of the Director (now the Under Secretary) of Defense, Research and Engineering. The paper identifies the issues involved in each decision and assesses the important factors including the threat, risk, military and economic consequences and the pros and cons of each alternative. Once the Development Concept Paper has been approved by the Secretary of Defense, it becomes the contract between the Secretary of Defense and the implementing Service Secretary to define the parameters in managing the programme. It is important that although the Development Concept Paper is a contract as such, it is constantly

revised as the programme passes from the conceptual stage through the full scale development phase and into production.

35. Prior to this agreement, the Navy had held a somewhat abbreviated VFAX competition. Subsequently, the Navy shifted support from the VFAX concept to the newly surfaced VFX design which soon became the F-14.

36. "F-15 Program Fact Sheet", United States Air Force, Andrews Air Force Base, August 1970, p.4.

37. Unit flyaway cost includes the airframe, avionics, engines and armament systems plus a small allowance (5 percent) for engineering change orders, modifications seen as necessary after testing to increase production efficiency, safety and performance. Arguably, the 5 percent allowance is a built in mechanism for cost overruns. It allows the contractors to be overly optimistic in their initial costs with the knowledge that should changes occur costing more than 5 percent, at least they have a foothold to argue for more increases.

38. For a discussion of DODD 5000.1, See, pp. 165-166.

39. For a discussion of Fiscal Cycle Overlap, See pp.139-143.

40. For a discussion of Graham Allison, See, pp.17-24.

41. Boyd's analysis of the relationship of aircraft energy and its changes resulted in a method to quantify manoeuvreability - the ability to change airspeed, altitude and/or direction in any combination. See, GENTRY, J, "Evolution of F-16 Fighter", op.cit., p.19.

42. BOYD, J, (Col.), telephone conversation, 2 February 1983.

43. GENTRY, J, "Evolution of the F-16 Fighter", op.cit., p.31.

44. Ibid, p.32.

45. ISAACSON, W, "Are Billions Being Wasted?", Time Magazine, 7 March 1983, p.15.

46. McNamara's Cost Benefit Analysis projected for five-year periods the cost estimate of related military programmes; to assess military power and the costs of military power by grouping tactical and strategic forces regardless of the particular military service that provided them. See, RAYMOND, J, "Power at the Pentagon", Billing and Sons Ltd., London, 1964, pp.300-304.

47. Senate Armed Services Committee Hearings, "Weapons Systems Acquisition Process", 92nd Cong., 1st Sess., 8 and 9 December 1971, p.286.

48. GENTRY, J, "Evolution of the F-16 Fighter", op.cit., p.30.

49. Ibid, p.31.

50. COOPER, B, Fighter Aircraft Program", Congressional Research Service, Washington DC, 21 January 1983, p.3.

51. Sprey selected the F-86 as the standard for turning performance because of this Korean War vintage fighter's exceptional subsonic turning capabilities. Thrust-to-weight ratio is the relationship between propulsion force (thrust) of the engine and the weight of the aircraft, which is a measure of the aircraft's capability to climb or accelerate. Stability refers to flying qualities - the ease with which a pilot can precisely control the aircraft. See, GENTRY, J, "Evolution of the F-16 Fighter", op.cit., p.32.

52. GENTRY, J, "Evolution of the F-16 Fighter", op.cit., p.32.

53. Senate Armed Services Committee Hearings, "Weapon System Acquisition Process", 92nd Cong., 1st Sess., 8 and 9 December 1971, pp.250-89.

54. HELMER, F, Management Innovations in Systems Acquisition", American Defense Policy, 4th Edition, Johns Hopkins Press, Maryland, 1977, p.281.

55. Kent had been involved with the F-X in several capacities since its inception in 1965. Initially in the Development Planning Section at Air Force Headquarters, he was transferred to Air Force Systems Command Headquarters to be the Deputy Chief of Staff for Development

Plans, and at this stage, was assigned as the Assistant Air Force Chief of Staff for Systems Analysis. Kent and Welch contributed to the F-X design studies by applying Boyd's Energy Manoeuvreability Concept to a computer simulation model which then could be used to compare the air combat capabilities of one fighter design with another. See, GENTRY, J, "Evolution of the F-16 Fighter", op.cit., p.32.

56. For a discussion of the Systems Concept Paper. See, pp.186.

57. For a discussion of the Decision Co-ordinating Paper, See, pp.186-187, and footnote 34 of Chapter 5.

58. HELMER, F, Management Innovations", op.cit., p.280.

59. Idem.

60. Idem.

61. For a discussion of the draft Resources Planning Guidance, See, I-9 of Chapter 3, p.118, and its implementation into the Defense Guidance I-9 through I-20, pp.118-122.

62. Office of the Air Force History, The F-15 Eagle, Origins and Development 1964-1972", November 1974, pp.62-65.

63. Ibid, pp.64-65.

64. Senate Armed Services Committee Hearings, Weapon Systems Acquisition Process", 92nd Cong., 1st Sess., 8 and 9 December 1971, pp.276-277.

65. The Total Package Procurement or TPP concept originated in the early 1960s under Robert Charles, then Assistant Secretary of the Air Force. The intent was to prevent contractors from underestimating programme development costs in order to win the contract and thus become the "sole source" for the follow-on production contracts. TPP basically required the contractor to bid on a total programme package for development, production and support. The failure of the concept on several systems, especially the C-5, led to its abolition by Deputy Secretary Packard in 1971. See, FOX, J, Arming America", Boston, Harvard University Press, 1974, pp.244-246.

66. One of the many causes cited for these cost overruns was the initiation of production prior to successful competition during the development phase. Often the development testing uncovered deficiencies requiring considerable aircraft modification to correct them. This obviously caused contractual cost and scheduling problems. See, "F-111 Aircraft", Department of the Air Force, op.cit., pp.3,12.

67. The Air Force solicited eight contractors including Lockheed, Northrop, Boeing and Grumman. However, only General Dynamics, Fairchild-Hillter, North American Rockwell and McDonnell-Douglas responded with proposals. All eight companies had participated to some extent in the earlier F-X concept definition studies. General Dynamics was eliminated in December 1968, leaving only three companies in competition. See, "F-15 Program Fact Sheet", op.cit., p.7.

68. In 1970, Pratt and Whitney was awarded a contract for development of the F-100 engine and Hughes was selected to produce the new radar. See, Review of the Military Qualification Test of the F-15 Engine", GAO Report, Washington DC, 3 January 1974, p.3.

69. The Defense Systems Acquisition Review Council (DSARC) is composed of top level officials from the Office of the Secretary of Defense. These officials review the programme recommended by the Service and provide advice to the Secretary of Defense in making key programme decisions. The typical programme has three critical decision points : Program Initiation (DSARC I); Engineering Development (DSARC II); and Production (DSARC III).

70. "The F-15 Eagle, Origins and Development 1964-1972", op.cit., p.97.

71. Memorandum from Assistant Secretary of Defense International Security Affairs, "Basic DoD Sales Policy and Guidelines", to the Departments of the Air Force, Army and Navy, 16 October 1969.

72. PACKARD, David, Deputy Secretary of Defense, letter to Mendel Rivers, Chairman, House Armed Services Committee, US Congress, 21 October 1969.

73. LAIRD, Melvin, Secretary of Defense, letter to Senator John Stennis, Chairman, Senate Armed Services Committee, US Congress, 21 October 1969.

74. US Congress, Department of Defense Appropriations Authorization for Fiscal Year 1970, 91st Cong., 1st Sess., Washington DC, 1969, p.83.

75. For example, the F-20, a privately designed aircraft by Northrop without Air Force assistance, was not purchased by the US Air Force. Perhaps this was because Northrop "was to build a little sister for the F-16, not rival it". Regardless, the plane not in American inventory, dissuaded foreign customers from purchasing it. See, EASTERBROOK, G, "The Airplane that Doesn't Cost Enough", The Atlantic Monthly, August 1984, p.46. Northrop, with no sales of the F-20 cancelled its programme in November 1986.

76. GENTRY, J, "Evolution of the F-16 Fighter", op.cit., p.34.

77. Memorandum from Secretary of Defense Melvin Laird, Requests for Proposals for International Fighter Program, 8 February 1970.

78. GENTRY, J, "Evolution of the F-16 Fighter", op.cit., p.35.

79. Ibid, p.37.

80. The designers who made substantial contributions were John Chuprun of Air Force Aeronautical Systems Devision, John Patierno of Northrop and Harry Hillaker of General Dynamics. See, MEYERS, Chuck, "Hi Lo What?", as printed in, Military Science and Technology, February 1981, p.42.

81. *Idem*.

82. *Ibid*, p.47.

83. For example, with the F-111 the initial contract price was $2.067 billion. However, finally, the Government conceded to a price of $5.344 billion. *See*, Staff Study *"F-111 Aircraft"*, Department of the Air Force, February 1973. Cost overruns are not reserved for large systems, for example, the Navy ordered from Alcan Aluminum, 2 Zuni rocket motors at a price of $1,642,500 in 1968 and paid $2,447,000 two years later. *See*, letter from Regional Manager of GAO, H L KRIGER, to Rear Admiral J A Scott, dated 19 March 1971.

84. FOX, J R, *"Arming America"*, Boston, Harvard University Press, 1974, pp.4-5, 457.

85. Some of the recommendations of the Blue Ribbon Panel were :

    1) Due to an increase of R&D funding in the USSR, there must be an increase in R&D funding to maintain technological superiority (*See*, pp.21-22 of Report);

    2) costs have increased substantially and may be due to the procurement practices of the DoD; new procedures must be tried. (Strategic Bombers, pp.11-12 of Report). *See*, Blue Ribbon Defense Panel Report, *op.cit.*, pp.11-22.

86. *"Packard Guidelines on Major Weapon System Acquisition"*, Armed Forces Journal, 13 June 1970, pp.22-23.

87. Report of the Blue Ribbon Defense Panel, *op.cit.*, (Supplement) p.12.

88. GENTRY, J, *"Evolution of the F-16 Fighter"*, *op.cit.*, p.41.

89. The direct purchase of the F-4E/F was viewed as both satisfying the desire of the Luftwaffe for a near-term air superiority fighter and the requirements to offset the US for the cost of stationing American forces in Germany. *See*, *"NATO Fighter, The Cheapest and The Best"*, The Economist, 12 April 1975, p.55.

90. Idem.

91. COLEMAN, H, "Swedes, British Vie for Role in Dutch, Belgian Aircraft Plans", Space Technology, 1 July 1974, p.15 and "NATO Fighter; The Cheapest and the Best", op.cit., p.55.

92. JOHNSON, Clarence L, Lockheed Aircraft Corporation, Letter "Lockheed Proposal for Construction and Test of an Advanced Single Engine Fighter - CL-1200", to Robert C Seamans Jr, Secretary of the Air Force, 14 January 1971.

93. Idem.

94. Idem.

95. GENTRY, J, "Evolution of the F-16 Fighter", op.cit., p.42.

96. See, footnote 75 of Chapter 5.

97. JONES, T, President and Chief Executive of Northrop Corporation, letter to General John D Ryan, Chief of Staff, Air Force, 31 January 1971.

98. Idem.

99. GENTRY, J, "Evolution of the F-16 Fighter", op.cit., p.44.

100. Interview with Mr Bert Cooper, Specialist in Aircraft Procurement, Foreign Affairs and National Defense Division, Congressional Research Service, November 1982-April 1983.

101. GENTRY, J, "Evolution of the F-16 Fighter", op.cit., p.46.

102. To avoid any confusion with DoD titles, the Director of Defense Research and Engineering (DDR&E) is supported by his staff, known as the Office of the Director, Defense Research and Engineering (ODDR&E) and as a reminder, it is this office which prepares the Decision Co-ordinating Paper, See, footnote 34 of Chapter 5.

103. FOSTER, Dr J, Director of Defense, Research and Engineering, Memorandum "Aircraft Prototype" to David Packard, Deputy Secretary of Defense, 12 February 1971.

104. _Idem._

105. SIMON, Allan D, Department of Defense, Research and Evaluation, Memorandum _"Fighter Attack Aircraft Prototype Study Plan"_, to Dr John S Foster (DDR&E), 2 March 1971.

106. GENTRY, J, _"Evolution of the F-16 Fighter"_, _op.cit._, p.49.

107. _Idem._

108. SEAMANS, Robert C, Secretary of the Air Force, Memorandum _"Aircraft Prototyping Plan"_, to David S Packard, Deputy Secretary of Defense, 7 May 1971.

109. PACKARD, David S, Deputy Secretary of Defense, return Memorandum to Robert C Seamans, Secretary of the Air Force, 8 May 1971.

110. For a discussion of DODD 5000.1, _See_, pp.165-166.

111. Department of Defense Directive Number 5000.1, 13 July 1971, p.2.

112. LOVE, Sol, Vought Aeronautics Company, Letter _"Proposal for Lightweight Fighter Aircraft, Submittal of"_ to David S Packard, Deputy Secretary of Defense, 28 June 1971.

113. GENTRY, J, _"Evolution of the F-16 Fighter"_, _op.cit._, p.56.

114. PACKARD, D, Deputy Secretary of Defense, return Memorandum to Robert C Seamans, Secretary of the Air Force, 8 May 1971.

115. For a discussion of the Program Decision Memorandum, _See_, Chapter 3, Section II-5, pp. 130-134.

116. COOPER, B, _"Fighter Aircraft Program"_, Congressional Research Service, Washington DC, 16 April 1979, p.2.

117. FOSTER, Dr J, Director of Defense, Research and Engineering & Evaluation, Memorandum _"1972 Prototype Program"_, to Robert C Seamans, Secretary of the Air Force, 15 November 1971.

118. GENTRY, J, _"Evolution of the F-16 Fighter"_, _op. cit._, p.60.

119. Senate Armed Services Committee Hearings, "Weapons Systems Acquisition Process", 92nd Cong., 1st Sess., 8 and 9 December 1971, p.114.

120. Ibid, p.132

121. Ibid, p.144.

122. GENTRY, J, "Evolution of the F-16 Fighter" op.cit., p.64.

123. "Status of the F-16 Aircraft Program", GAO Report, Washington DC, 9 April 1977, p.2.

124. Idem.

125. Ibid, p.16.

CHAPTER 6

THE DECISION TO CHOOSE A FIGHTER

The General Dynamics fighter aircraft entered production in 1977 as a co-manufacturing/co-production effort for the US Air Force and the services of Belgium, Denmark, the Netherlands and Norway. In only a period of five years since the release of $12 million from Congress in the FY 1972 Appropriations Bill it had not only entered production, but had a current order (in 1977) of 1,736 units, and other countries, at that time, were considering its purchase.[1] In understanding how the F-16 fighter left the drawing boards to eventually become the advanced fighter, attention must return to events of the previous Chapter.

The F-16 was a fallout of the Lightweight Fighter concept, especially from the controversial F-XX (sometimes referred to as the FX[2]) study of 1968, which first suggested the hi-lo mix concept. As seen, it was received with much scepticism in the Pentagon, since it was more or less viewed as a threat to the evolving F-14 and F-15. Following the events of the previous Chapter, and with the influence of the Fighter Mafia, Requests for Proposals (RFPs) were authorised and released by Air Force Secretary John McLucas to the aircraft industry on 31 December 1971. The Requests for Proposals (RFPs) were issued in January 1972 initially to Boeing, Fairchild, General Dynamics, Grumman, Lockheed, LTV, McDonnell-Douglas, Rockwell Internation and Northrop. By April of 1972, General Dynamics' YF-16 (the "YF" designation is used for the experimental prototypes) and

Northrop's YF-17 entries were selected. Within four months the competitors had been narrowed down to two. Prior to pursuing this investigation, it is necessary to give attention to a few central focal points as follows : First, although the RFPs were released on 31 December 1971, it is not as if the "competition" began instantaneously. For example, Ling-Temco-Vought (LTV) sent a letter on 28 June 1971 to Deputy Secretary of Defense Packard, six months before the RFPs were released, outlining a formal proposal of a programme for two V-1100 lightweight fighter prototypes. The research and development of the contractor is a continuous process. Moreover, the contractor has to be aware of and astute to developments within the Pentagon, Congress, <u>et al</u>, and be able to balance these varying influences, so as to plan for and develop the required hardware.

Second, this is accomplished by the contractors maintaining a line of communication with and working alongside DoD Components, namely, the Office of the Assistant Secretary of Defense, and Systems Analysis (where Pierre Sprey worked, which prepared the Systems Concept Paper).[2] Another DoD Component, assisted by contractors, was Dr John Foster's staff within the Office of the Director, Defense Research and ~~Evaluation~~ Engineering. In the Chapter detailing the Life Cycle of a weapon system it was identified that this DoD Component has responsibility for initiating and preparing the Decision Co-ordinating Paper (DCP).[3] To stockpile information on research and technological developments (state-of-the-art), these components rely on information from contractors which the DoD Components see in the form of a Research and Technology Work Unit Summary[4] or a Research and Development Planning Summary.[5] For example, in the former document the intention is to "identify scientists or engineers who are working in technical areas of interest so they can be contacted for further technical information".[6] This cements a very close relationship between DoD Components and contractors. There are many different DoD Components constantly researching new ideas to meet various new requirements or needs. Various Components, receiving information of technological developments will be choosing between differing levels of the state-of-the-art, having worked with engineers and scientists of the contractor. Each contractor may be pursuing similar lines of research (wing design and its effects to avionics), but more than likely, will be pursuing different avenues (variable sweep wing or fixed wing designs). Eventually, one contractor is chosen by one Component for its needs, but the second (contractor) has not lost because there may be a slightly different need for another DoD Component, for example, the USAF's F-16 (General Dynamics) and the Navy's F/A-18 (Northrop). Essentially, the point is that there are hundreds of contractors and once one Component has chosen a contractor (or in the case of the F-16 initially nine contractors were narrowed down to two), that contractor will be concentrating and working with that Component whilst the other contractors will shift their priorities of research and development to secure future contracts from the same or other Components who are continuing to research the development of new systems. This is not only achieved during the earlier stages of weapon systems acquisition, but throughout the life of the system as demonstrated through the testing and evaluation. (For example, some F-16s have the new General Electric engine, instead of Pratt and Whitney).

Although research and evaluation should be seen as a continuous and dynamic phenomenon, with the contractors competing against one another (as well as competition between Services or within a Service), the DoD Components, based on the Services' requirements, are ultimately liable to choose which contractor would best serve those requirements. More information and previous activities of Northrop and General Dynamics illustrate and provide insights as to how within a few months after the Requests for Proposals were issued, nine contractors were narrowed down to two.

General Dynamics and Northrop - The Chosen

As the 1960s drew to a close, it became increasingly apparent to NATO nations that there was a need for "a replacement of the F-104 that could fly faster than Mach 2 and cost as little as possible".[7] As a result of Northrop's close association with three NATO nations,[8] it began to design a new fighter to meet the new need. As mentioned in the previous Chapter, Northrop's project was the P-530 Cobra which, though bearing a faint resemblance to the F-5, was larger and faster with weight of around 25,000 pounds. The main sales pitch was, at the time, that anybody who wanted a fighter would be unable to find a better one - the Cobra would, Northrop promised, "outfly any other aircraft in the future sky".[9] The reason for Northrop pursuing such a pitch was that the weight of the plane was 5,000 pounds less than the insured thrust from two GE15 afterburning turbojet engines. These engines, although still being researched by General Electric, enhanced Northrop's position. At the Paris Salon, in May 1971, General Electric displayed a detailed mock-up of the GE15, under its new designation of J101, which revealed its Department of Defense funding. Northrop, with its design, and with the GE-J101 engine's performance level capable of more than Northrop required, the future potential of these combined with a new radar system seemed infinite.[10] By the end of the Paris Salon, Northrop appeared to be the only horse in the running, and had taken negotiations to an advanced stage with several potential customers in Europe, as well as being interested in talks in Canberra. If Northrop had been left alone, it might have ultimately clinched a massive global deal for the 1,000 Cobras, beating the Mirage, F-1, F-14 and F-15. But, as the previous Chapter denotes, within weeks of the Paris Salon, Deputy Secretary of Defense David Packard, on 25 August 1971 in a Program Decision Memorandum (PDM) approved Air Force plans and funding for the Lightweight Fighter programme. Two days later the Air Force Prototype Program Office was established.

That decision was to prove very significant indeed, and it held dire consequences for Northrop's current programme. Northrop was forced to alter its priorities.

The Lightweight Fighter programme was merely an exercise to see how far it would be possible to fly useful military missions with a fighter significantly smaller and cheaper than the F-15.

Bids were invited, and contenders were told that as there were no USAF requirements for such an aircraft, they had a fairly free hand. New technology was the objective and its purpose was to fly rival prototypes and see how they stacked up against the F-15, and to analyse the recommendations of the fighter pilots at Nellis Air Force Base (Fighter Weapons School, Nevada). If the outcome was positive, there was a chance that an aircraft in this category might be procured for the USAF inventory, after a further competition.

After the signing of the PDM, Northrop recognised it was no longer alone in the rate - unless it could reach a deal with the Europeans before any other Lightweight Fighter took shape. Northrop failed to reach such a deal. At the same time, Northrop also was cognisant of the FX and FX^2 studies and the activities of Dr Foster and his staff within the Office of the Deputy Director, Research and ~~Evaluation~~ Engineering, and the work of Pierre Sprey within the Office of the Assistant Secretary of Defense Systems Analysis. Following the approval of the PDM, it was imperative for Northrop to shift its priorities and assess the outcome of the Air Force bids. Northrop shifted its priorities and according to its President, Mr Thomas Jones, they literally worked day and night to create the P-600 (streamlined on the in-house P-530 Cobra).[11]

Meanwhile, General Dynamics was working equally hard on a complete new design, which did not only incorporate the analyses of Boyd and Sprey. The General Dynamics Team at Forth Worth, Texas, sought to incorporate new technologies, while at the same time balancing these with some of the existing high technologies. For example, General Dynamics chose the Pratt and Whitney F-100 afterburning turbofan engine which had already been developed for the F-15 but the General Dynamics Model 401, as their model was designated, would only use one engine instead of two. This strategy pursued by General Dynamics was brilliant because it served three purposes. First, it lessened the risk of there being too many "bugs in the system". Second, it reduced the cost to General Dynamics (and ultimately to the Air Force) by buying already made parts off the shelf instead of developing new ones themselves. Third, and the author suggests, that General Dynamics' strategy was to use existing parts not only from the viewpoint that the contractor is saving money, but that he is also securing contracts by empire building. During the prototype fly-off competition (and later throughout the stages of the Fiscal Cycle where costs were questioned) General Dynamics was able to argue that it would reduce costs by applying the learning curve of weapons production. Further, General Dynamics was able to bring down not so much its own costs, but more importantly, the subcontractors' costs, with increased orders for the F-16, and therefore an across the board saving was realised. For example, the costs for the research and development of the Pratt and Whitney F-100 engine, and the costs for tooling up and manufacturing the engine, had all been done for the F-15 programme and, further, that engine was already in production. This lessened the cost for General Dynamics. More importantly, though, General Dynamics was securing its contracts by arguing that since the Air Force was initially planning to buy 650 F-16s, that would be 650 more high technology engines that were to be ordered from Pratt and Whitney. This would have the effect of reducing Pratt and Whitney's cost of the engine, since more were on order, and thus reduced costs for the F-15 programme. General Dynamics also identified for USAF consumption, (and later for Congress et al) 254 identical items used in other aircraft, and another 78 modified from other use - thus, using only 20 percent new parts.[12]

Another reason for the General Dynamics Model 401 incorporating so many similar parts was simply that General Dynamics was behind Northrop in the competition to replace the F-104. Once the rules of the game had changed with the approval of the Lightweight Fighter Programme, General Dynamics needed to use existing parts to quickly assemble its design and compete in the programme. However, more has to be said of General Dynamics' history to fully appreciate why they would react to the competition.

Founded in 1952, General Dynamics was one of the first of the nation's big post-war conglomerates. It was founded around the nuclear submarine builder, at Groton, Connecticut, now the Company's Electric Boat Division, by John Jay Hopkins. Financed largely by profits from the nuclear submarine building boom of the 1950s and 1960s, the corporation grew and diversified. It took over the Consolidated Vultee Aircraft Corporation (now its Convair Division) in 1954, and moved into shipbuilding, building materials, coal mining and other fields.[13] In large part, after major successes early in its history the story of General Dynamics was one of a sequence of disasters. For example, between 1959 and 1961, it had to write off $435 million as the result of an ill-timed unsuccessful effort to sell commercial jetliners. Its Convair 880 and 990 jets never found a market to compete with the Boeing 707 and McDonnell-Douglas DC-8.[14] Six years later, it also had to write off losses of more than $200 million on a trouble-plagued effort to enter the surface-ship market. Smaller but substantial losses were also incurred in commercial microfilming, consumer electronics and other ventures.[15]

Regarding contractsfor the Air Force, General Dynamics had also suffered. Although much of the blame for the F-111 cost overruns had been attributed to the supervisory policies (Total Package Procurement) of former Defense Secretary Robert McNamara, General Dynamics suffered because of the management of the project.[16] Originally called the TFX, the F-111 was supposed to cost $4.5 million each, but the final price - for a plane which fell short of the original objectives of the Pentagon - was $15.6 million each.[17] Regardless of their problems, General Dynamics has recorded more years in the black than in the red, largely because of profits from work done on Polaris, Poseidon and the Trident missile submarines, as well as nuclear attack submarines. Moreover, work done on the F-111 was completed under the cost-plus-fixed-fee contracts[18] which guaranteed a profit despite the huge overruns. Arguably this type of contract was and still is another mechanism to lessen the risks for the contractor.

In 1970, General Dynamics' growing losses and problems with the F-111 created a shake-up within the company which ousted the Chief Executive Roger Lewis, and he was replaced by David S Lewis, who had previously been the president and chief operating officer of the McDonnell-Douglas Corporation. The two men are not related. David Lewis was instrumental in the decision, for General Dynamics quickly entered into the arena for the Lightweight Fighter. David Lewis had been with McDonnell-Douglas during the development of the F-15 (McDonnell-Douglas - F-15 "Eagle" Fighter). He was extremely valuable in that he was familiar not only with the developments of the F-15, but also with the problems of McDonnell-Douglas in the development of the F-15. Also, he still had very close connections to those DoD Components, who were involved in the exchanges of technology and measuring them against the performance of the F-15. For example, he celebrated in 1968 when the first F-X study was ended, which put forward the likelihood of McDonnell-Douglas chances for the contract of the F-15. But now with General Dynamics, he was fully cognisant of all the Lightweight Fighter supporters' arguments against him with the F-15, and used those arguments to his advantage. Also, he was involved in the Research and Development of the engine for the F-15, conducted by Pratt and Whitney, and his relationship with Pratt and Whitney would still be coeposetic. This was a driving force for General Dynamics to choose their engine for the F-16. (Aside from his previous experience, Pratt and Whitney - a subsidiary of United Aircraft Corporation - is located in East Hartford, Connecticut, about 40 miles from General Dynamics headquarters in Groton, Connecticut.) Whatever

David Lewis' influences from his past experience, as an insider with the F-15 he was able to ensure that the risks to General Dynamics were kept to a minimum. This being the case, and remembering that DoD Components have a longer period of tenure, most if not all from the F-15 programme were also those judging the performance of the General Dynamics Model 401.

Thus far, it has been shown how these two companies and their designs were proceeding in the Lightweight Fighter programme, but still the issue as to why these two were narrowed down from the original nine companies, who received Requests for Proposals, has not been answered. "The main reason General Dynamics and Northrop were selected out of several bidders on the LWF project was that their approaches epitomised by the one versus two-engine design, to the project were significantly different."[19] This was an obvious reason, but if Boeing was "interested" it would not have submitted a proposal with two engines if it were considering ways to lighten the weight! The intention is not to become involved with what the other seven companies were doing at the time, but some examples tie in the notion that they were already "occupied". For example, Boeing was proceeding with the commercial aircraft industry, Fairchild was involved with the A-10 Close-Air-Support Aircraft, and McDonnell-Douglas with its F-15. These companies were involved with other projects and would have little reason to enter the Lightweight Fighter competition. They were pursuing their own line of research and development which did not fit into the context of the needs for the Air Force Lightweight Fighter

Programme. On the other hand, Northrop had shifted its focus earlier to replace the ageing F-104s with the P-530, and later again to the P-600 in an attempt to be considered. General Dynamics churned out its Model 401 for consideration because it purposely wanted to shift its focus from the F-111 as reflected in its management shake-up, and to secure future USAF contracts. "We've got to live down the F-111", said a General Dynamics vice president. "All we can say is that we've changed our management; we've only got two of the top management people left from the F-111 days, and David Lewis is not Roger Lewis."[20]

In April 1972, General Dynamics YF-16 (patterned on their Model 401) entry and Northrop's YF-17 (modelled on the P-530 Cobra and P-600) were selected, with $37.9 million awarded to General Dynamics and $39.1 million to Northrop for two demonstrators each.[21] The funds were made available by the Secretary of Defense from the "slush fund" of money available to fund Research and Development at his discretion.[22] These awards were also of the "cost-plus-fixed-fee" mode of contract and covered the design, construction and test of two prototypes by the US Air Force; plus one year of flight testing.

As mentioned earlier, General Dynamics selected an aircraft design using a single Pratt and Whitney F100 engine, and economised development of the two demonstrators. The approach saved time and money, and the company unveiled the first aircraft at Fort Worth, Texas, on 13 December 1973 - a mere 21 months after General Dynamics received the $37.9 million contract. The first flight took place "accidentally" on 20 January 1974, but it was "officially" flown for the first time on 2 February 1974. General Dynamics was ahead in the running - Northrop did not conduct its first flight of the YF-17 until 9 June 1974.[23]

Following their first flights, a leisurely year-long 300-hour US Air Force evaluation was planned. However, this schedule was changed in the Fiscal Year 1975 budget, when Secretary of Defense James Schlesinger announced the Air Combat Fighter Programme that was to design and produce a more economical air superiority fighter to augment the F-15 and replace the F-4 in the 1980s.[24] Both the YF-16 and the YF-17 became candidates for selection by the Air Force as its "missionised" Air Combat Fighter aircraft. In August 1974, General Dynamics and Northrop each received $4 million to develop Air Combat Fighter prototypes for the Air Force based on the YF-16 and YF-17 Lightweight Fighter prototype models. The Navy also requested Fiscal Year 1975 funds for development of a Navy Air Combat Fighter (designated originally as the VFAX programme), as a less expensive complement to the F-14 and a replacement for the F-4 and A-7 in carrier-based attack roles.

As Col. William E Thurman, who headed the Systems Program Office at Wright-Patterson AFB, Ohio, for the Air Combat Fighter Program, stated: "The Lightweight Fighter prototype program office of Aeronautical Systems Division has begun to resemble a normal system program office organisation as the result of the Defense Department decision to initiate full-scale development."[25] The reasons for this decision were varied and on the surface, the decision by SECDEF Schlesinger to launch the

Air Combat Fighter was not a major turning point. Arguably, the reasons for the decision were based on the outside pressures exerted on the SECDEF, and the level of investment awarded by his office, these make the decision all the less notable. One of the external pressures being exerted on the SECDEF at the time were the results of the 1973 Middle East War. The US Air Force has always fought its wars under numerical superiority, but October of that year saw a close ally (Israel) struggling to win air and battlefield superiority against forces abundantly equipped along Soviet lines. The argument of quantity versus quality was brought home within defence circles in a conflict in which one observer estimated that some forty percent of the Israeli fighter force was lost, or damaged to the point where it was not available for combat, within the first two days.[26] Thus, the events of the 1973 October Middle East War were on Congress' minds during their consideration of funding for the Air Force and Navy for their Air Combat Fighter Program. Discussed below, another pressure exerted on Congress was the need by NATO nations for commonality to replace the F-104 Starfighters.

Another reason that this decision was not crucial to the F-16 programme is the amount of funding given by the SECDEF for the launch of the Air Combat Fighter, in comparison to the previous funding received in the programme.

A total of $8 million was awarded for the Air Combat Fighter programme. However, $12 million had been invested for the launch of the Air Force Prototype Study and a further $77 million ($37.9m to General Dynamics and $39.1m to Northrop) for the launch of the Lightweight Fighter. Essentially, the $8 million would not have been a major boost compared to the $77 million received only seven months earlier.

Nevertheless, the decision to launch the Air Combat Fighter programme was crucial to the F-16 programme even if the decision was not entirely credited to the SECDEF. At this time, the commonality issue had returned to Congress, and it was imperative that the Air Force have a programme in the works that could withstand the Congressional scrutiny of that issue. In these regards, even the simple change of a title of a programme would have significant consequences. A Lightweight Fighter programme can easily fit into the context of Naval operations, as compared to an Air Combat Fighter, which denotes a specialised mission for the Air Force.

Prior to these activities, the roots of this decision go back over two years. The Prototype Study programme was funded in FY 1972 and since then, funding had been received from Research and Development funds from the Office of the Secretary of Defense. Also since then, the programme had developed into the Lightweight Fighter programme. However, in August 1972, the sequence of events for the Planning, Programming and Budgeting System (PPBS) of the Fiscal Cycle were initiated for the FY 1975 Budget.[27] That was why the programme was receiving its first consideration in the 1975 DoD Budget. The Congressional review of the FY 1975 Budget took place beginning in January 1974. Congress completed its work on the Budget in early August (to break for the summer recess) of 1974. The suggested reason for the decision was due to the fact that Congress had inserted language which stressed the commonality of aircraft for both the Navy and the Air Force. Further, and discussed below, Congress froze the funds for FY 1975 until the Air Force supplied information of its programme and choice of contractor. Thus it was necessary for the Air Force and the SECDEF to bolster the programme.

Congressional Scrutiny and Its Effects

The competition between the General Dynamics YF-16 and Northrop's YF-17, which began in 1972, was intensified in 1974 by Congressional insistence on commonality between the Navy and Air Force Combat Fighter designs. Also, the decision to select the Air Force Combat Fighter by early 1975, followed the Secretary of Defense's announcement of the Air Combat Fighter programme (the US Air Force shortened its evaluation period by nearly six months).[28] Obviously, the Air Force meant business, but more importantly this action enhanced the position of the Air Force in Congress' eyes for the following reasons : First, the Air Force (as opposed to the Navy) was in the prime position of holding prototypes, which had already exhibited their performance. Speeding up their trials, the Air Force would have an aircraft and contractor chosen by January 1975. Considering the events of October 1973, the Air Force appeared to Congress to be functioning well in its duties of translating new mission requirements from outside threat appraisals into hardware. Second, should commonality be the maxim exerted by Congress through the 1970s and 1980s, the Air force wanted its design accepted first before the Navy's. The Air Force advocating increased air-to-air combat capability, did not want to have to scale that down, as it did earlier when it had to accept the Navy's A-7 in 1965 and design their aircraft from it which evolved to become the F-5.

Another factor for the increase in competition between Northrop and General Dynamics was their knowledge of NATO's interest in buying aircraft to replace the F-104 Starfighter. This will be discussed. Though, the major concern here is Congressional reaction, the NATO factor was also a consideration.

There was little opposition in Congress to the Air Force Air Combat Fighter programme and $32 million of DoD's $36 million FY 1975 request was provided.[29] Congress was also in general agreement on the Navy's need for a Lightweight Fighter, but there was strong feeling in the House Appropriations Committee's Defense Sub-Committee that these Services should develop a common aircraft in regard to airframe, engine, avionics and weapons. The DoD's Director of Defense Research and ~~Evaluation~~ Engineering, Dr John Foster, maintained, however, "that the differing characteristics and unique requirements of land and carrier-based aircraft would preclude such commonality".[30] The Navy's request for $34 million in FY 1975 was opposed by the House Armed Services

Committee but approved by the Senate Armed Services Committee, and an authorisation of $30 million was agreed to in conference.[31] However, both the House and Senate Appropriations Committees were critical of the Navy's position on the Lightweight Fighter, and the conference report on the FY 1975 Defense Appropriations bill cut that request and stated: "The $20 million provided is to be placed in a new program element titled 'Navy Air Combat Fighter' rather than VFAX. Adaptation of the selected Air Force Air Combat Fighter to be capable of carrier operations is the prerequisite for use of the funds provided."[32] The report added that further funding would be "contingent upon the capability of the Navy to produce a derivative of the selected Air Force Combat Fighter design."[33] The Air Force's strategy had paid off well. This complicated the issue for the Navy, for it meant that Navy officials must return to Congress and satisfy the mandate issued in the Appropriations Bill for maximum use of the Air Force's Air Combat Fighter technology before the $20 million in the Fiscal Year 1975 budget could be released for a Navy Air Combat Fighter development programme. Congress' intention here, and with good reason, was that in producing both lightweight fighters it would be better having the Air Force and the Navy working compatibly at this stage, than the Navy commencing again with an original design for the Navy. This was the outcome because the "Navy and the USAF have been working jointly to study the possibility of developing a variant of either the YF-16 or YF-17 for carrier operations. The wording in the appropriations concerned the Navy even though Defense officials believed that 60-70% commonality in lightweight fighter technology would satisfy Congressional intent".[34] However, it was subsequently realised that the intentions of Congress had an important effect on the part of the contractors.

On 11 September 1974, the Department of Defense announced that the Air Force would buy 650 Air Combat Fighters of whichever design was selected in January 1975. The momentum of the programme had increased, because timing for the Air Force selection was crucial in order to keep the Navy at bay. The Navy would plan to buy some 800 Air Combat Fighters, but its final decision was not to be made until after the Air Force selection. (Also, remember that NATO's F-104 Starfighters were to be replaced.) The contractors, mindful of Congressional hearings and the debates, were soon to discover that the commonality issue was of less importance than the reaction that it had heralded. The Navy's decision had more than doubled the amount to be manufactured for US inventory and if the orders to replace the Starfighters were included, the total package could be well over 3,000 aircraft, Certainly priorities within Northrop and General Dynamics changed, and they did, but, no-one expected them to enter into alliances with the previous competition. On 7 October 1974, Northrop announced that "it had entered into agreement with McDonnell-Douglas for joint development and proposal for an air combat fighter for the Navy based on the YF-17 design".[35] McDonnell-Douglas would be the prime contractor for the carrier-based aircraft for the Navy Air Combat Fighter, and Northrop would have the responsibility for the US Air Force's Air Combat Fighter and other variants for foreign sales. General Dynamics did not enter a formal agreement, but joined forces with LTV Aerospace to design jointly a Navy derivative of the YF-16. LTV would provide experience in design and production of carrier-suitable aircraft. "The joint design would make maximum use of the technology and hardware from the YF-16", company officials said.[36]

There are some issues and points that resulted as spin-offs of special events that should be treated here. It is obvious that the decision centres shifted as the programme entered the hardware phase. Then, the programme followed a gradual evolution and became more politicised when it entered the public arena, for example, the Congress. Earlier, during the conception of the F-16, for example, the F-X study or FX^2 study, the decisional centres were to be found within the corridors of the various DoD Components. This is because they were concerned with the routine tasks and research, and reported their activities to their superiors. During the non-hardware phase, those in authority, aside from being concerned with other programmes in their hardware stages, and the overall managing of the Department of Defense, only had time, if any, to review these new developments which attempted to match needs that were coming from the Components. This situation was further exacerbated with new arrivals to fill top positions - they were quite busy either learning the processes, or attempting to infuse their own personal management techniques than be concerned with new research and development. In other words, the DoD Components appeared to be perfectly capable of managing on their own, in the assessment of mission needs, strategies and the research and development of new systems to match whatever new requirements were necessary. As witnessed, they were assisted in these endeavours with contractors who were either communicating or sharing new research or developments in weapons technology. Seemingly, the two worked very closely and complemented each other's needs.

However, once the weapon system entered the hardware phase, the decisional centres not only shifted, but shifted in different directions quite frequently, which, aside from confusing a contractor as to the original mission needs (this must be a factor in driving up costs), created a picture that the acquisition process was indeed very risky and complex. But the assertion thus far has been to demonstrate that it is not a process riddled with uncertainties. It is a very compartmentalised process, but from the viewpoint of the contractor, that in itself lessens their risks, and also creates advantages for the contractor in that there are constantly many new mission requirements to fulfil. However, in this case, the decisional centres shifted upwards (Secretary of Defense) in order to secure monies to flesh out the necessary hardware and it was essentially money, and how that limited resource was spent, and on what, which politicised the process. At this stage, it became the role of the managers acting as politicians, to guide that programme through the maze of the acquisition process. There are two types of uncertainties from the viewpoint of the contractor - technological and political. These uncertainties have been lessened by the mechanisms within the acquisition process such as cost-plus-fixed-fee contract, Fiscal Cycle overlap, direct line of communication between DoD Components and contractors (re sharing R&D) and each mechanism tends to be reflected more than the other in various decisional centres. For example, the research and development and prototyping of the new developments of the F-16 were conducted in a less political arena, in relation to the later stages, by various DoD Components, who were involved in the mission needs. From the F-X study throughout 1971, much of the technological uncertainties or problems had been solved and money was secured for the Lightweight Fighter programme. Although more technological problems surfaced during the actual building of the prototype, it appeared that the F-16 at this stage, began to travel down the continuum of the political uncertainties. To assist the programme in this endeavour, there were various means exerted both by those in authority and within the DoD Components to lessen these uncertainties. For example, as witnessed, the Secretary of Defense released funds at his discretion for continuing the funding for the programme, thereby side-stepping Congress. It would also be naive to assume that he actually reached this decision on his own, in the respect that the decisional centres of the DoD Components were exerting their influence, in the form of their expertise, to secure more funds for the continuance of the programme. This was a relatively less political decision, but the Secretary of Defense was also the expert in monitoring the mood of Congress, the NSC, Presidential Directives, the media and other outside influences such as the Department of State and balanced those variables against his decision to continue funding. In other words, during the early days of the hardware stage there were two decisional centres, each influencing the other, in an attempt to secure the future of a system. When this shift occurred, the political momentum increased, and from the viewpoint of the contractor, such variables (mood of Congress, commitments of the Secretary of Defense, its relationship in the programme with DoD Components) influenced him to assess his position and shift his focus. For example, as witnessed, when the Lightweight Fighter programme was launched, Northrop had to shift its focus and design a new prototype. Another example was when the Navy announced that it would be looking for some 800 Lightweight Fighters, both Northrop (with McDonnell-Douglas) and General Dynamics (with LTV) entered into some type of arrangement to secure those contracts.

Furthermore, although the political momentum increased, the suggestion herein was not that the responsibility of the programme was handed over from the DoD Components to the Secretary of Defense. Although the Secretary of Defense may be more expert in political affairs, he was reliant on the concerned DoD Components for the expert advice of the system, which he utilised to his advantage. For example, the Secretary of Defense eventually announced the decision of the F-16 versus the F-17, but for the right decision he was reliant on the concerned DoD Components who had sifted through all the flight trials _et al_, and were the experts in evaluating the two. However, they were mindful of costs and effectiveness because their information, fed upwards to the Secretary of Defense, was crucial for the programme. It was then the endeavour of the

Secretary of Defense to use this information to the best of his abilities, and then adapt his rhetoric to a fine tune balancing cost savings, benefits, and the best in technological performance to meet the requirements. Much of this work had already been completed by the DoD Components for him. For example, much of the information was initiated in Justification for Major System New Start or a Decision Co-ordinating Paper or in DODD 5000.1 documents. The politically aware Secretary of Defense used that to his advantage. However, that also further demonstrated the influence of the DoD Components in setting the parameters for augmentation within the political spheres.

The point is that during the non-hardware stages the political risks for a weapon system are minimal compared to the technological uncertainties. As the system progresses through and into the hardware stages, the political uncertainties increase and the technological risks lessen. The suggestion is not that once a system is developed there are no technological risks or changes - there are - however, a means of lessening the technological changes that will certainly arise is to "design in potentials"[37] that are amenable to the changes. This is one feature of modern weaponry, and it will be demonstrated later in this discussion. As one Armaments Systems Specialist for the F-16 (USAF) stated in June 1986, "It [the F-16] is still a Virgin in the Sky".[38]

Before turning attention to the Air Force's decision to choose the F-16, another point to be aware of was the timing of the decisions. Obviously enough, this was crucial in preparing any strategy of decision making, but all the more so when it came to securing funds in the acquisition system. For example, it was due to pressure from NATO that the Air Force chose a Lightweight Fighter earlier than intended. (Choice was to be made by USAF originally in May 1975; pushed back to January 1975.) Also, once the programme had gained momentum (the Air Combat Fighter) funds were required, and the Air Force had to be bargaining from an advantageous position to be included in the Fiscal Year 1976 Budget (the last window open for insertion into the Defense Budget was late December/ early January 1975). Moreover, formal hearings in the House and Senate Armed Services Committees began in January/February 1975 for consideration of the Fiscal Year 1976 Budget.

The above is an indication that as the weapon system becomes politicised, it succumbs to the time constraints of the Fiscal Cycle, and whether or not this might impede technological advances in weaponry would be interesting to research. The opinion herein is that in a broad sense, it is negligible in so much that there is evidence of designing in future potentials in modern weaponry, and further that the research and development of a system continues even after deployment. Nevertheless, the risks would increase for a specific weapon system by making shorter the time available for testing and evaluation.

Air Force Selects YF-16 as Air Combat Fighter

On 13 January 1975, Secretary of the Air Force, John McLucas, announced that the General Dynamics Corporation, Forth Worth, Texas, YF-16 had been selected for full-scale engineering development as the Air Combat Fighter. Secretary McLucas said that the "award of a fixed-price incentive contract for $417,904,758 to General Dynamics to fabricate 15 engineering development F-16 aircraft. In addition, Pratt and Whitney received a fixed price incentive fee contract for $55,500,000 to produce the F100 engine used in the F-15."[39] The press release also stated that, "at the same time, the United States is negotiating co-production arrangements for the Air Combat Fighter with a multinational fighter consortium, comprised of Belgium, Denmark, Norway and The Netherlands. A decision by the Consortium is expected within the next 90 days."[40] Prior to examining the NATO question, which is partially responsible for the choice of the General Dynamics design, it would be helpful to focus upon the reasoning behind the Air Force's choice of the F-16.

McLucas' comment to the Pentagon Press Corps was followed the next day, 14 January, when Defense Secretary James Schlesinger said, "that the main reason for choosing the YF-16 was its use of a single proven engine".[41] Another reason offered later by Secretary John McLucas was that the F-17 was "2,000 pounds heavier and its transonic drag rise starts earlier and stays higher across the flight program. How are they going to fix these problems?"[42] The underriding tone of that statement was that the Air Force would have had to have spent more money, but more importantly, time to resolve the problems had they chosen the F-17.

The General Dynamics F-16 Multirole Fighter was a single-seat, single-engine, supersonic fighter-attack aircraft, powered by the Pratt and Whitney F100 turbofan engine (25,000 thrust-pound class) which was already used by the F-15 (two engines). Both the YF-16 and the YF-17 were designed primarily as air-combat fighters, but with secondary air-to-ground attack capability as well. Both prototypes featured new aerodynamic designs to improve manoeuvreability (Boyd and Sprey) and carried the same armaments. The F-16 has "fly by wire" flight control where wires from four computers transmit electronic commands - as versus mechanical links - to the control surfaces of the aircraft. When the pilot gives the aircraft basic instructions with his controls, the computer changes the control surface to minimise wind drag and alter the centre of gravity of the aircraft. This gives the craft enormous manoeuvreability, a major asset for a fighter plane.

The major difference between the YF-16 and the YF-17 involved the engine, weight and performance capabilities. For example, the twin-engine YF-17 had a gross takeoff weight - including internal fuel, two Sidewinder missiles and 500 rounds of 20mm ammunition - of 25,000 compared to the single-engine YF-16's 20,800 pound class including fuel and the same armaments.[43] Also, the planes differed by one-engine (YF-16) versus two-engines (YF-17). "Regardless, the competitive fly-off between the two airplanes, conducted at Edwards AFB, California, throughout the latter part of 1974, disclosed a pair of well-designed dissimilar fighters".[44] Col. Heinl went on to say that "each model, in most cases, tested out at, or above, specifications and was significantly more manoeuvreable than currently operational first-line fighters".[45] "There was not a whisker between the two aircraft in their arduous fly-off - both had done very well".[46]

Both aircraft designs appeared to satisfy the mission needs and requirements - the only major differences being weight and the issue of one or two engines. For the "expert" DoD Component at Edwards AFB, weight did provide an advantageous edge to General Dynamics since it was a programme to design a Lightweight Fighter. However, the details of the decision were not complete.
The "expert" DoD Component also realised that the other factor was the engine, the Pratt and Whitney F100, which was already in production for the F-15 versus the General Electric YJ 101 engine, at that time still in the prototype stage, for the F-17. It was the engine (Pratt and Whitney F100), which was already being produced, that was the pivot in the decision, not so much for the expert DoD Component, but also for the political advantages that it would yield when trying to secure funds. "The Air Force nod went to the single-engine YF-16 not only on marginally better performance than the Northrop entry, but mainly because the YF-16 is powered by the already operational Pratt and Whitney F100 engine the Air Force is using in its sophisticated long range F-15 fighter."[47] Although still a relatively apolitical statement, the undertones

which tie in cost, is of concern to Congress et al. "By sharing power plants, both the F-15 and the YF-16 will reduce cost for each project [learning curve] and simplify maintenance".[48] Earlier in January, Schlesinger had said "the main reason for choosing the YF-16 was its use of a single proven engine".[49] However, later in February (hearings were conducted in the House and Senate Armed Services Committees as well as the House and Senate Appropriations Committees), Secretary of Defense James Schlesinger claimed that "the YF-16 would save some $300 million in fuel bills over the YF-17 over a 15 year period".[50] He suggested "something in the order of 36 percent fuel savings per flying hour".[51] Even General Dynamics' private opinion of this "guesstimate" was unprintable. Schlesinger later claimed "that over the 15 years planned life cycle, YF-16 selection would save the Air Force $1.3 billion".[52] Later too, US Air Force Secretary John McLucas added "that the YF-16 had actually been far in advance of the YF-17".[53] Originally, the fact that the engine for the F-16 was in an advanced state compared to the engine for the F-17 was the issue, but now the performances of the aircraft as a whole were being debated. Choosing an engine already in production, was a prudent decision in regard to lessening the risk of new technological systems. What was probably a good decision on the part of the DoD Components was now being politicised. Proof of this, from another perspective, was evidenced in the above statements. The consumer of such rhetoric would be led to believe that the F-17 was not really that good an aircraft. Why then, so shortly afterwards, did the Navy choose Northrop's YF-17 to become the F/A-18 which the Navy has in its inventory today?

Additionally, but to a lesser degree, the number of engines was a factor which had to be weighed against the preferences of NATO. Several US friends and allies reported that at the time they were "preferring a twin-engine plane".[54] In fact, "the General Dynamics entry has always been a dark horse. The favourites are the Cobra and the Mirage".[55] If this were the case, the Air Force and the Department of Defense were jeopardising its political chances by choosing the F-16. More about NATO's involvement is necessary at this point to assess its influence on the decision to choose the F-16.

There are interchangeable views of the F-16 programme when considering NATO and its role in that programme, but the scheme of the programme remains clearer and more concise if both roles exist simultaneously. The F-16 was a military programme created in order to develop and produce an advanced low-cost, multi-purpose fighter for the US Air Force and the Air Forces of four NATO Allies - Belgium, Denmark, the Netherlands and Norway. Of equal importance, the F-16 programme was an economic programme designed to strengthen the NATO alliance through coproduction. The former viewpoint may be less political than the latter. Nevertheless, given the environment of the alliance it is most difficult to look at a coproduction effort involving NATO and ascertain whether or not it was military or political. "Since the mid-1960s, the real burden of achieving weapons standardisation has shifted to the civil authorities and institutions within NATO. This shift recognised that achieving co-operation in development, production and procurement is fundamentally a political and economic problem and thus more than just a military problem".[56]

Moreover, in the case of the F-16 to replace the ageing F-104s other factors must be considered. "The first is the need to replace weapon systems which have become obsolete."[57] There are a number of reasons why weapons must be regarded as obsolete, for example, the military requirement may have changed. "Closely related to the replacement factor is the effect of technological developments on the method of waging war itself."[58] The tendency is to introduce new weapon systems which supplement the old system, but do not immediately render it obsolete.

"The next factor can be loosely described as industrial. There may be pressure from defense related industries or from politicians anxious to promote the economic interests of a particular region or industry".[59] What complicates this more so for NATO than the US, is that "connected with this is the political factor. The structure of any country's armed forces are, in the first instance, governed by the role which the government envisages for them".[60] Obviously, with so many different governments structuring their forces along the influences of the politicians, the industrial research of new technologies to replace systems can be a very risky business indeed. Also what further complicates the NATO connection for the decision of the F-16 is the fact that many European defence industries are nationalised.

Aside from this backdrop in the case of the F-16, another topic heavily weighing on those in the decisional processes, was the introduction of Rationalisation, Standardisation, Interoperability and Specialisation.

John F Kennedy declared, "that the United States will be ready for a declaration of interdependence;"[61] "11 years later, Kissinger in his historic Atlantic Charter speech in April 1973 re-launched the idea ... 'For us European unity is what it has always been, not an end in itself, but a means to strengthening the West' ...,[62] prompted a "misunderstanding"[63] as well as "recriminations over the lack of Alliance consultation during the Middle East War in October 1973; arguments on the recurrent theme of NATO burden-sharing which focused in particular on the Jackson-Nunn Amendment to the 1974 Defense Appropriations Authorisation Act requiring the United States Administration to reduce forces in NATO Europe to the extent that their foreign exchange costs were not met by the European allies."[64] Although the intention of this Amendment was to head off more demands for a reduction of American forces, the Amendment was "widely resented in Europe for its mercenary overtones."[65]

These dismal preoccupations diverted some of the attention and energies of NATO from more productive channels of co-operation mentioned above, namely :

<u>Rationalisation</u> is making commitments and following through with the aim of making best possible use of available alliance resources.

<u>Standardisation</u> is the achievement of using identical equipment and procedures in order to produce economic advantages as well as the military benefits.

> Interoperability, which is to achieve compatible equipment and procedures designed to increase operational effectiveness.
>
> Specialisation is where countries carry out certain defence tasks on behalf of allies and rely on the latter for the performance of other tasks. The idea is not only to enable individual countries to save money, but to use it efficiently.[66]

Even though 1973 and 1974 seemed dismal, in June 1975 the Governments of Norway, Belgium, the Netherlands and Denmark selected the F-16 to replace their somewhat obsolete F-104s and F-5s, which was widely held as a milestone for NATO Standardisation.

Seven years earlier, on 19 July 1968, West Germany, Great Britain, Italy and the Netherlands had signed a Memorandum of Understanding to develop jointly an advanced tactical fighter for the mid-1970s to replace the ageing F-104s, G-91s and other aircraft. Canada and Belgium were expected to participate creating a market for at least 1,000 aircraft. Although Canada, Belgium and the Netherlands withdrew from the project, the MultiRole Combat Aircraft (MRCA) became one of the largest European industrial programmes ever undertaken. The first MRCA prototype flew in August 1974 and, in 1976, contracts were signed to produce the aircraft. Deliveries began in 1979. The aircraft was designed, researched, produced and deployed by British Aircraft Corporation, Messerschmitt-Bolkow-Blohm and Aeritalia. This co-operation of the MRCA was quite dissimilar to that of the F-16. Arguably, the F-16 was a sales deal to European customers, and as a sales pitch to entice them to buy for their own inventory, jobs were promised to their own industries. It was co-operation but, it falls quite short of applying the intentions of Rationalisation, Standardisation, Interoperability and Specialisation (RSI&S); except to those who subscribe to the belief that, if all of NATO purchased American weapons, the problems of R,S,I and S would all disappear. Nevertheless, the "F-16 program was born on both sides of the Atlantic"[67] out of the same desire to replace ageing aircraft, but was pursued along different paths. In the US, a prototype demonstration programme was under way to evaluate the application of advanced technology, low costs, a lightweight highly manoeuvreable aircraft. The US Air Force accelerated the Lightweight Fighter programme, and later the Air Combat Fighter programme. Based on the fly-off, the US Air Force chose the General Dynamics F-16, which launched a full-scale development programme.

Prior to the US Air Force announcement of selection, the Belgian, Danish, Netherlands and Norwegian Governments were evaluating the need to modernise their tactical air forces. In May 1973, these four European states organised a steering committee to seek a common system for procurement. In 1974, the four co-operating Governments insisted that the US, Sweden and France offer them favourable co-operative production arrangements before a choice would be made from three competing tactical aircraft offered for sales :

1) Swedish JA-37 Viggen (Saab/Scania)
2) French Mirage F-1/M53 (Avions Marcel-Dassault)
3) US YF-16 and YF-17 (General Dynamics, Northrop) [68]

The race was off and running - for example, toward the end of June, Sweden unveiled a massive $1 billion non-defence industrial package to establish factories in Holland and Belgium in a major effort to sell the Viggen fighter to the two countries.[69] Interestingly enough, Britain also made an offer to the Belgians, with the approval of Marcel-Dassault, to share in the French Fl Mirage and mix in 110-118 Jaguars, and offered the Belgians 75% of the value of the contract in industrial offsets. At that stage, the Fl Mirage was still on paper and despite Britain's partnership with Dassault, made this comment to the Belgians in its formal presentation : "The British may be forgiven for suggesting that, and not for the first time, Belgium is being invited to relieve the French taxpayer of much of the burden of inaugurating French projects of uncertain future and open-ended costs."[70] Needless to say, that partnership soon ended and neither did it help the French. The race reached such a frenzy that an executive of Northrop said, "Everybody is flying in everything he's got, including the Wright brothers ... it's a buyer's market like we've never seen before".[71]

By the end of August 1974, it seemed fairly clear that the Swedish Viggen was ahead of the game along with the American companies. The British Jaguar was still considered in some circles, because like the Viggen, it was already under production unlike the American fighter (the F-16 had not yet been chosen), but the Jaguar's effectiveness in air-to-air combat was handicapped because it was initially intended as an air-to-ground aircraft. By September, the Mirage had moved ahead of the Viggen, not so much based on its performance, but because the Swedish traditional stance as a neutral nation began to affect its selection as a major arms supplier to NATO countries. "The Swedes wanted the new fighter contract so badly that they promised to build their planes in the Netherlands and Belgium" so as not to upset their neutrality stance. In fact, "they went so far as to promise to invest $1.2 billion in non-aeronautical ventures in Holland and Belgium over the next 10 years including Saab auto and Volvo truck plants."[72] (This upset the trade unions of these corporations in Sweden.)

The importance of all this lies in the fact that Secretary of Defense Schlesinger, himself, travelled to Brussels on 12 December 1974 and, in an obvious reference to French and Swedish attempts to influence the NATO consortium to "buy European", Schlesinger said, "effective deterrence and low cost should be the overriding considerations".[73] A week earlier (5 December) Schlesinger had said that the US proposed to assure substantial amounts of offset work to the European sub-contractors on the Air Combat Fighter including the transfer of technology of the Pratt and Whitney F100 engine. A week later, he appeared to be stiffening his position when he said, "I think that to the extent that European equipment is superior to American equipment, we should look at it. But the decision with regard to military equipment should not be to take care of parochial interest groups in any of the nation states, and it should not be to permit excess capacity to continue to flourish in any one of those nations".[74] Although there is a degree of hypocrisy in Schlesinger's statement, still this was something the European nations concerned wanted to hear - especially those with a penchant for the "two-way street" approach to weapons procurement with the US. However, what the US says in such statements and how it acts are usually removed from one another.

Following the decision to choose the F-16 over the F-17 (13 January 1975), several NATO countries favoured "the Northrop plane because it is a two-engine aircraft while the F-16 is a single-engine plane. A twin-engine fighter, it is felt, is safer to operate over densely populated areas of Europe. However, cost works in favour of the General Dynamics aircraft".[75] The major bargaining chip was that if the Europeans chose the General Dynamics F-16 instead of the F-17, or the French Mirage F-1, the US would take care of the $1.6 billion development cost, but if the Europeans chose Northrop's F-17, its developmental cost (slightly more than $1.6 billion) would have to be absorbed in the price.[76] Perhaps a "two-way street" but, somewhat stilted for a European choice. Pentagon officials adopted a plan to persuade the NATO countries to buy the F-16. Led by Defense Secretary James R Schlesinger, they worked out a production agreement under which the four countries would receive 10 percent of the work on all US Air Force orders for the plane, 40 percent of the work on planes bought by European military forces (ergo 60 percent to US) and 15 percent of the work on all planes ordered by third nations.[77] This offer was made in mid-February 1975 and the Netherlands and Denmark opted for the F-16s.

A further inducement was made on 24 February, whereby the US Government would not restrict the technology transfer to European engine manufacturers who would be involved in the Pratt and Whitney F100 engine in the event that the NATO consortium chose the F-16. This was the sweetener for the Dutch. They would receive, in engine work, "$149.5 million and gain about 1,400-1,600 jobs".[78]

On 3 April 1975, the Defence Ministers of the four states agreed that the F-16 possessed "undisputed advantages in operational qualities and programme costs",[79] over the other competitors. In late May, Norway, Denmark and the Netherlands[80] signed preliminary contracts for the purchase of the F-16, and "pressures intensified for the Belgian Government to make the final plunge".[81] Even though the Belgians had been "awarded thus far most of the sub-contracts for the Pratt and Whitney F100 engine"[82] they appeared not to be impressed. This eventually changed when the Belgian Defence Minister, Paul Vanden Boeynants, met with Secretary of Defense James Schlesinger on 2 June 1975. This was the final inducement - Schlesinger agreed to purchase 16,000 machine guns from Fabrique Nationale (the main sub-contractor for the F-16) for $32 million.[83] The Belgians had planned to sell 260,000 machine guns to the French, but the French were stalling because the French planned to buy the guns when the Belgians opted for the Mirage. This not being the base, the Belgians then stalled on the F-16 issue until the agreement on the guns purchase was reached with Schlesinger. As Pentagon sources said, "there is no question that Schlesinger's encouragement helped to persuade Vanden Boeynants to decide in favour of the General Dynamics F-16".[84] On 7 June 1975, the Belgian Government approved and joined the governments of Norway, Denmark and the Netherlands in buying 348 F-16s (Belgium 116: the Netherlands 102; Norway 72; and Denmark 58).[85]

The purpose of this discussion concerning the European factor in relation to the F-16 is not to provide an historical account on decisions made within those NATO countries, but rather to provide insights that they were essentially persuaded through various means to buy and co-produce the F-16. They lacked direct participation in the decision to choose the F-16 over the F-17, however it is not suggested that the European connection was unimportant - it was, and it was in the minds of the Pentagon as well as those in General Dynamics.

Six months before the US Air Force selected the F-16 the contractors were also busy in Europe. On 7 June 1974, it was "Otto Glasser, General Dynamics vice-president-international, and James Beggs, vice-president-aerospace, who briefed Belgium, Holland, Norway and Denmark on the plans for initial production of 318 aircraft for the four countries".[86] Although the concern here was related to future sales and coproduction, it placed General Dynamics in a more advantageous position in the final decision to choose the F-16. The European connection was more indirect than direct. In all fairness, Northrop would be doing the same lobbying in Europe, however Northrop had a unique and unforeseen problem - Tom Jones, its chairman, president and chief executive.

Amidst all the lobbying efforts, in May 1974, Tom Jones pleaded guilty to charges brought by the Watergate special prosecutor of making illegal contributions to the Nixon campaign. In itself, that would have been an embarrassment, however, the Watergate charges so angered a stockholder, New York corporation lawyer Jay Springer, that he hired a California public-interest law firm and sued Jones and the company.[87] At the same time the suit was filed, Northrop undertook a special audit. It revealed that at least one of a network of "worldwide consultants used by Northrop had been returning part of Northrop's fees to the US for political contributions for the past 12 years".[88] This damaged Northrop's image in its lobbying efforts for the NATO connection which hurt its position for future sales to Europe. It had an indirect effect on the choice of the F-16 versus the F-17. Any direct effect of the guilty plea to the US Air Force in its decision was negligible, because had there been a cause and effect relationship, the Navy, also, would not have chosen the F-17 to become the F/A-18.

The other issue which affected the choice of the F-16, yet to be mentioned, is jobs. Jobs are a very important issue in weapons procurement. However, at this stage (the competition between

Northrop and General Dynamics) it was less important simply because both companies were in a position to promise new jobs, should their design be selected. In fact, it was probably be a non-issue before the final selection by the USAF because, the US Air Force was searching for a low cost Lightweight Fighter. The position of either Northrop or General Dynamics was not enhanced by the promise of even 2,000 jobs more than the competition. That sort of job commitment in numbers would cause the competitor the risk of being more expensive than the other, which would lessen their chances of securing the contract. On the other hand, during the lobbying efforts for NATO's participation, jobs were an issue. For example, David Lewis, Chairman and Chief Executive of General Dynamics, said in November 1974, "We are looking at having talks with some 80 to 100 European companies as possible sub-contractors on the F-16".[89]

On the other side of the Atlantic, jobs were a heated issue immediately after source selection, as well as a significant factor in persuading Congress, with its fiscal responsibilities, not only to purchase the initial buy of the F-16, but also its future procurements. The day after the announcement to choose the F-16, jobs appeared in the headlines, for example, in the San Diego Union on 14 January 1975, the headline ran : "F-16 Fighter Contract Expected to Boost Jobs Here in Two Years", which stated that the "$417 million contract to build the first 15 developmental engineering models ... is expected to generate between 55,000 and 65,000 new jobs overall ... with some coming to Convair and Electronics divisions in San Diego".[90] Also the next day, 15 January, at Fort Worth, Texas, where the General Dynamics plant is located, "more than 1,000 unemployed workers were at the plant when the gates opened".[91]

Furthermore, jobs were not only important in themselves, but also the location of jobs. In the case of the F-16, there were sub-contractors found in 32 States, aside from the foreign co-producers (see Appendix 3). The importance of spreading sub-contracts throughout the US, although it increases production costs (costs of shipment, communications, et al) makes economic sense in the production of weapons, because it translates into votes from Congress. After the initial buy of 15 aircraft, if "55,000 - 65,000 jobs" are created in 32 States (and more would be forthcoming in full production), Congressional members, especially on the House side, because they are elected every two years (6 years for Senators), are most concerned with the creation or maintenance of jobs. Another example is the F/A-18 for the Navy (which was the Northrop YF-17 design) whose main contractors are Northrop and McDonnell-Douglas. They are affiliated with "powerful names like O'Neill and Kennedy in Massachusetts where General Electric makes the engines. (The GE J101 used for the YF-17 was ultimately replaced by a derivative - the GE 404). There are a lot of jobs at stake : in Missouri where McDonnell-Douglas assembles the plane; in California, Northrop's home base; and in 41 other States where Hornet [F/A-18] parts are made"[92] - a total of 44 States!

Obviously, jobs and the strategy of location were important, but in the case of a prototype fly-off competition, their importance, as stated, was less in influencing the Air Force to make the decision between the YF-16 and YF-17. However, before source selection, jobs were an important factor for the prospective contractors in their decisions regarding their choice of sub-contractors to later enhance their position if chosen.

After the choice of General Dynamics, jobs also became an immediate issue for Northrop. It is suggested that the loss of jobs may have been a direct influencing factor for the Navy's selection of the YF-17. The choice reversed job losses, and the prevention of their loss, has the potential to translate into votes for the appropriation of funds. "Northrop, of course, has been bailed out by the F-18 fighter decision."[93]

As the loser of the Air Force competition, "Northrop faced elimination from the fighter plane market in the US and overseas. Current foreign orders for its F-5 International Fighter - the only fighter it now turns out - suggest that it can keep production going only through 1977. But if the Navy picks up the development costs of the F-18, Northrop can look forward to substantial foreign sales during the 1980s".[94] If indeed Northrop was bailed out, could the same argument be applied to General Dynamics considering that its production run on the F-111 would eventually end? Perhaps, but not in the sense of a bail out. Simply, General Dynamics is in the aircraft business to make money, profits and secure jobs. It entered the fighter competition along with eight other aircraft companies, which eventually were narrowed down to two, and following various trials which were conducted on the two prototypes, General Dynamics won, and was selected as the prime contractor. Both General Dynamics and Northrop had devoted much of their energies on being awarded the prime contractor. Once Northrop had lost, it had to shift its priorities in research and development to secure future contracts from other DoD Components, as previously mentioned. However, this situation was unique in that Northrop had been heavily engaged in the programme since January 1971 with the introduction of its P-530 Cobra design. Aside from its production of the F-5, Northrop had been concerned with this programme for four years. Other aircraft companies had submitted designs in January 1971. However, to submit designs as opposed to committing oneself to the production of a prototype reflects a measurement of the differing involvement. For instance, LTV or Lockheed, whose designs were not accepted, were able to shift their priorities with little, if any, loss. However, in the case of Northrop, the losses could well have been disastrous.

On the surface, it appears that prototyping increases the risks and uncertainties of weapons procurement because it is ultimately a win or lose situation. However, it is suggested that it is a win-win situation. In the case of the F-16 versus the F-17, Northrop was eventually bailed out, using as its case the arguments for jobs et al. More importantly, though, Northrop had been working with the same DoD Components as General Dynamics and was "in the know" of the requirements for both the Air Force and the Navy in their aspirations for a Lightweight Fighter. Once the choice was made by the Air Force, General Dynamics would be concentrating its limited resources on its new contract, whilst allowing Northrop to shift to other requirements of other DoD Components, in this case the Navy. Meanwhile, General Dynamics was not in a position to sell the F-16 to the Navy after the Air Force had argued that it fulfilled a required need. Further, for the same reason, and also because of inter-service rivalry, the Navy did not want the F-16.

The point is that the more money, man hours, material and other resources invested by the contractor whilst working with DoD Components, the better the chances for that contractor to ultimately secure contracts or arrangements with a given Service. First, due to the increase in the complexities of high technology in new weapon systems, the DoD Components are heavily reliant upon contractors for new research and developments. In essence, it would not serve the interests of the DoD Components or Service to allow that source to "dry up". And the contractors are so well entrenched in the DoD, that the onus of keeping contractors economically healthy falls upon the DoD Component or Service. Not only are they reliant on the contractors but they also run the risk of their integrity as participants in the acquisition process being put to the question, if a major contractor should falter because of decisions of that DoD Component. For example, a DoD Component or Service might place its "expertise" in jeopardy if job losses becomes a heated issue, especially in Congress. In the case of Northrop, had that occurred, Congress may have scrutinised the whole concept of prototyping, as Congress had done to the concept of Total-Package-Procurement for the F-111 after the cost overruns.

There were other variables involved in the Air Force's selection of the F-16, particularly its rival - the Navy. Attention, to provide a better understanding of the selection of the F-16 and the consequences for Northrop, must now be diverted to some of the Navy's activities during this time period.

Navy Opts for Northrop's YF-17, The F/A-18

Earlier mention was made that in 1974, the Navy requested $34 million for FY 1975 for funds to develop the Navy's Air Combat Fighter. After opposition in the House, and following a Conference Committee, the Navy received $20 million from this request. Commonality advocates within Congress originally envisioned that the adaptation of the selected Air Force Air Combat Fighter to be capable also of carrier operations was the prerequisite of the funds provided. The report added that further funding would be "contingent upon the capability of the Navy to produce a derivative of the selected Air Force Combat Fighter design".[95] As stated earlier, this complicated the issue for the Navy because the Navy had to return to Congress and satisfy them that the maximum use of the Air Force's Air

Combat Fighter technology had been completed before the $20 million would be released to the Navy. Congressional intent was that the Navy would work closely with the Air Force instead of starting at zero point. The intent was that the Navy would also have to buy that which the Air Force decided upon, and adapt it to carrier performance. However, in this regard, Congress is relatively weak in dictating its wishes to the Services.

In September 1974, the Air Force announced that it would purchase 650 Air Combat Fighters and the Navy 800 Fighters. In line with Congressional guidance, Northrop joined teams with McDonnell-Douglas and General Dynamics with LTV. This increased the competition between Northrop and General Dynamics. NATO's interest to replace its F-104 Starfighters was also pressing. Originally, the Navy had not intended to make its decision until mid-1975 but with the Air Force's decision in January 1975, and to be followed shortly by the Europeans, the Navy reached its decision on 2 May 1975.

The Navy selected the F-17, known today as the F/A-18 or Hornet, which is a derivative of the US Air Force Northrop YF-17 Lightweight Fighter Prototype that was altered to adapt the aircraft for carrier operations. The most significant change involved the engine - which was substituted by a more powerful engine manufactured by General Electric - the GE 404 (originally the YF-17 had the YJ 101(GE) prototype engine). Also, the Navy preferred the YF-17 with its twin engines because it "would mean Navy aviators over water would still have an engine going if one conked out".[96]

Congressional criticism of the proposed F-18 focused on the Navy's failure to select a derivative of the Air Force/General Dynamics F-16 as required by the FY 1975 Defense Appropriations and also, on the cost of the F-18 in comparison with the F-16 (Schlesinger's statements). Regarding the former, the Senate Appropriations Committee was told in early May by Malcolm Currie, Director of Defense, Research and Engineering, that the "three General Dynamics/ LTV Aerospace variants were not suitable for carrier operations".[97] On 9 May 1975, LTV Aerospace Corporation filed a formal protest with the General Accounting Office (GAO) charging that the Navy's action violated the Congressional mandate, and contended that the Navy Air Combat Fighter competition should be reopened to allow LTV to design a plane that could meet Navy requirements. GAO delivered a decision on 1 October 1975 in the Navy's favour, stating that "Navy selection of particular aircraft design for its Air Combat Fighter and resultant award of sustaining engineering contracts cannot be regarded as contrary to law".[98]

Regarding costs, the Office of Management and Budget sent DoD a "working paper" showing the F-18 and F-14 to be about equal in cost under certain conditions and suggested that it might be "more cost effective to buy more F-14s and A-7s, instead of initiating the proposed F-18 programme".[99] However, DoD challenged their cost estimates and programme assumptions, and the Navy expressed strong support for the F-18 in testimony before the House Appropriations Committee, citing the F-14's "high follow-on operating and support costs",[100] and the F-18's expected "performance capabilities as a less expensive fighter and attack plane".[101] The F-18's operating costs were given as "36% less than the F-14s", and the F-18 was described as "superior to the A-7 in combat capabilities".[102] On 8 October 1975, the Navy testified before the Senate Armed Services Tactical Airpower Sub-Committee and said that an "800-plane F-18 program supplementing 224 F-14s and 202 A-7s in the FY 1976-90 period would cost $25.2 billion [FY 1975 dollars] in investment and operating costs, compared to $27.8 billion for other possible combinations of aircraft using F-14s and A-7s".[103] According to their calculations, the Navy indicated that the F-18 mix would at first be more expensive than the other two before FY 1984/85 and then slip downwards after that, so it was less expensive over the entire 15-year period (1976-90).

The reason for the mention of the Navy's F/A-18, aside from it being the derivative of the F-17 which kept Northrop afloat, is that again, as witnessed in the F-16, the "expert" DoD Components are able to exercise their influence upwards. For example, the Navy was fully aware that its choice did not meet Congressional language in the Appropriations (FY 1975) Bill constraining the Navy to a variant of the Air Force/General Dynamics F-17 Fighter, and yet, the Navy, through its expertise testified to Congress that their intention did not produce the best result. Furthermore, when seeking $110 million in Fiscal Year 1976 for the F-18[104] they were still able to make it appear cost-effective (unit cost in

1975 - $9.6 million based on an order of 800 including R&D)[105] set against its own inventory, thereby avoiding the issue of comparing the cost to the F-16 ($4.6 million unit cost for a 650 US order).

The previous discussion illustrates that as the decision for the Air Force selection of the F-16 drew closer, not only did the decisional centres begin to vacillate, but also a variety of internal and external variables were operative on these decisional centres. Also, these variables do not have to be contemporary with the events of the decision, but can be past events or future expectations from that decision. For example, some of the past events which played a role were earlier contractor actions, F-111 cost overruns and European sentiment to NATO's RSI(&S) which, in particular, also played a role for future enhancement of standardisation for the tactical air command structure in Europe. Examples of present pressures being exerted include Congressional commonality advocates, inter-service rivalry, again NATO RSI(&S), _et al_. Also, these variables can be seemingly unrelated events such as the Watergate scandal. Furthermore, the inclusion of personalities, individual preferences, internal organisational structures and other such variables, creates a list of pressures which seem endless.

Regardless, the interesting feature is not so much how many pressures may be operative, but from whom or which centres they are directed, and toward whom, which provides a clearer picture of when the shifting occurs. The central character in ascertaining this shift is again the DoD Component.

During the earlier stages, it is the DoD Component working with the contractor, and receiving very few pressures from above, excepting overall management directions, whilst exploring the possibilities of new weapons. They are responsible for the documentation pertaining to the matching of requirements and technologies et al of a specific system, and usually avoid external pressures such as Congress (for example, monies received from R&D funds). The other major pressure that is exerted on the DoD Components or Services is a lateral one, commonly designated as inter-service rivalry.

As the weapon system progresses through its Life Cycle, it also has been continuing through the Fiscal Cycle, to the degree that, Congress scrutinises the system. For example, the Prototype Study began from Congressionally authorised funds in FY 1972 and Congress debated in late 1974 funding for the Air Force purchase for FY 1975 - 26 months later since initiation for FY 1972 Thus the external pressure of Congress for the funding of the system necessitated a greater involvement of the SECDEF.

Essentially what transpired was that in the earlier stages of development, the pressures placed on the DoD Component in its decision making were for the most part lateral. These came from contractors pushing for the alteration of requirements or from other Services. To a lesser degree the DoD Components received directives from above. Later, as the system requires more funding, those in authority enter the scene. But the interesting feature was that, even so, the

DoD Components maintained their standing in the decisional processes to implement the programme. Further, the SECDEF, upon entering the scene was not alone. Lateral pressures from the Secretary of State were also applied to his office as well as pressures from above, for example, from the President, Congress, *et al*. Thus, the pressures seemingly emanated from three levels. Whether this was the case is the focus of the following Chapter. However, if this scenario bears credence, easily understood then it why weapons acquisition decision making is problematic for models.

N O T E S

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2. For a discussion of the Systems Concept Paper, See, p.186.

3. For a discussion of the Decision Co-ordinating Paper, See, pp.228-229.

4. For a discussion of the Research and Technology Work Unit Summary, See, p.203.

5. For a discussion of the Research Development Planning Summary, See, pp.203-204.

6. Research and Technology Work Unit Summary (DD Form 1498), Department of Defense Instruction 772-.13.

7. GUNSTON, B, "F-104 to F-16 : A Tale of Aircraft Procurement", Interavia, Vol.3, 1976, p.27.

8. Northrop, which had sold 1,000 T-38 trainer versions to the USAF and followed with an even larger number of F-5 Freedom Fighters for America's Allies.

9. JONES, T, President and Chief Executive of Northrop Corporation, "Silver Cloud, Dark Lining", FORBES, 15 December 1974, p.40.

10. Another contractor demonstrated an attractive radar system known as ATLAS (Advanced Tactical Lightweight Air Superiority) at the Paris Salon. Hughes was offering this system to the Cobra. See, GUNSTON, B, "F-104 to F-16 : A Tale of Aircraft Procurement", op.cit., p.28.

11. JONES, T, "Silver Cloud, Dark Lining", op.cit., p.40.

12. General Dynamics, "F-16 Fighting Falcon", Company Report, June 1981, p.5.

13. Ibid, p.17.

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16. "F-111 Aircraft", GAO Staff Study for Department of the Air Force, Unclassified, February 1973, p.5.

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18. For a discussion of Cost-plus-fixed-fee Contracts, See, pp.147-149.

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21. General Dynamics, "F-16A/B, Fighting Falcon", DMS Market Intelligence Report, DMS Inc., 1980, p.1.

22. For a discussion of SECDEF funds for Research and Development, See, pp.141-143.

23. "Modern Fighting Aircraft : F-16", Salamander Books, London, 1983, p.9.

24. COOPER, B, "Fighter Aircraft Program", Congressional Research Services, Washington DC, 27 December 1982, p.9.

25. "Lightweight Fighter Gets New Impetus", Aviation Week and Space Technology, 15 July 1974, p.127.

26. "Modern Fighting Aircraft : F-16", op.cit., p.11.

27. For a discussion of the PPBS, See, pp.110-113.

28. Another reason for bringing the deadline forward was that the four NATO nations had sent a delegation to the US in May 1974 to discuss possible LWF procurement. Selection of the USAF's fighter was not scheduled until May 1975 but the Europeans wanted a decision by the end of September 1974. Most likely there was a compromise to agree to January 1975.

29. COOPER, B, "Fighter Aircraft Program", Congressional Research Service, Washington DC, 27 December 1982, p.8.

30. US Congress, House Committee on Appropriations Sub-Committee on Department of Defense, Hearings, 93rd Cong., 2nd Sess., Washington DC, 1974, p.810.

31. COOPER, B, "Fighter Aircraft Program", Congressional Research Service, Washington DC, 27 December 1982, p.2.

32. US Congress, House Committee on Appropriations Sub-Committee on Department of Defense, Hearings, 93rd Cong., 2nd Sess., Washington DC, 1974, pp.829-42.

33. Idem.

34. "Combat Fighter Options Weighed", Aviation Week and Space Technology, 14 October 1974, p.12.

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49. GUNSTON, B, "F-104 to F-16 : A Tale of Aircraft Procurement", op.cit., p.29.

50. Idem.

51. Idem.

52. McLUCAS, J, "YF-16 Better and Cheaper", Armed Forces Journal International, February 1975, p.18.

53. GUNSTON, B, "F-104 to F-16 : A Tale of Aircraft Procurement", op.cit., p.29.

54. "Military : Everything Works", op.cit., p.42.

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57. FACER, R, "The Alliance and Europe : Part III Weapons Procurement in Europe - Capabilities and Choices", Adelphi Papers, The International Institute for Strategic Studies, 1975, p.3.

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   [Brigadier General James A Abrahamson was the USAF Program Manager for the F-16 Combat Fighter Program, Wright-Patterson AFB, Ohio. He was responsible for directing the five-country consortium of effort to develop and produce the F-16 fighter aircraft.]

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73. "Schlesinger Boosts US Fighters in NATO Competition", Aerospace Daily, Vol.70, No.29, 12 December 1974, p.225.

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improve their arms capabilities. The announcement reverberated throughout the four-nation consortium - Denmark decided to postpone its decision until the Dutch situation was clearer, which led Norway to postpone until the Danes were ready. The Defence Minister of Holland, Mr Henk Vredeling, himself a Social Democrat, who argued against the resolution, had been indicating a preference for the F-16, and finally managed to convince the Danes and Norwegians that the resolution came from only one (his own) of several political parties and was not a binding Government edict.

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CHAPTER 7

THE PRODUCTION OF THE F-16 - ITS DEPLOYMENT FOR NATO, USAF AND THIRD PARTIES

NATO Sale and the Co-production Programme

In 1974, four NATO countries - Belgium, Denmark, the Netherlands and Norway - formed a consortium to select a common replacement for their F-104 fighters in the 1980s. The General Dynamics YF-16 and the Northrop YF-17 prototypes, at that time, contending for selection by the US Air Force (and the US Navy), were actively promoted by their manufacturers in this European market. Momentarily, the discussion has not continued with the production and deployment of the F-16. This is intentional, because the F-16 was not a weapon system solely intended for US consumption, with perhaps later sales to foreign countries. The F-16 programme was a "joint business effort to produce the F-16 in the United States and in Europe ... The ultimate goal of the programme [was] to place certain F-16 production business in Europe to offset 100 percent of the cost of the Europeans' initial buy of 348 aircraft".[1]

To coherently understand the production and deployment of the F-16, attention must again return to Europe and the activities of the manufacturers, the US Air Force, The Pentagon and the US Government. This will illustrate further, the shifting that had occurred from the decisional centres of the Air Force and DoD Components to those in authority in the Pentagon (JCS, SECDEF), as well as other participants of the US Government, involved in weapons acquisition, who entered the scene for the manufacturing, deployment, and foreign sales of the F-16. The purpose is to promote the suggestion herein that as the hardware phases continue (in the sense of along a continuum within limits of time), the less apparent will be the activity of the DoD Components (unless, for example, they are called upon to testify to Congress as experts for choosing a system over another) whilst the role of the managers increases (Secretary of Defense), utilising their political skills. Although the DoD Components' activities have apparently subsided, in relation to the other participants, their influence in the decision making of the acquisition process has not waned, and remains the most constant throughout the life of a weapon system. Prior to a discussion of NATO and the F-16 co-production effort, a further discussion of Rationalisation, Standardisation and Interoperability of weapon systems is necessary within the context of NATO, to assess whether or not the F-16 was a collaborative effort.

Standardisation of NATO forces was a goal set in the first year of the alliance, when in 1949, the signatories of the North Atlantic Treaty created a Military Production and Supply Board to promote "co-ordinated production, standardisation and technical research in the field of armaments".[2] In NATO's first few years, there was a "relatively high degree of standardisation based on American and British war surplus equipment".[3] In retrospect, an effective standardisation of NATO forces "over the last quarter century might only have been maintained if the post-war vision of a united Europe in alliance with the United States had turned to reality".[4] However, because the US and Europe lacked a "compelling military rationale for developing an integrated conventional defense, the United States and the West European Allies were unable to create the political, economic and military framework that would have been required to rationalise the NATO defense effort".[5]

The US interests in, and the trans-Atlantic "dialogue on, NATO Rationalisation/Standardisation/ Interoperability could be said to have begun in earnest in August 1974[6], with the passage and signing of the DoD Appropriation Authorisation Act for FY 1975, containing the first of a series of so-called Culver-Nunn amendments expressing Congressional interest in NATO standardisation".[7] (This is the same FY 1975 Appropriations in which the Air Force and Navy were attempting to receive funds for the Air Combat Fighter.) Subsequent to the Culver-Nunn amendments, the American disengagement from Southeast Asia "removed a major hindrance to America's leadership role in the Atlantic Alliance and allowed American policymakers to focus attention on security interests in Western Europe".[8] American forces in Europe, which had been undermanned and malequipped during the Vietnam conflict, "began to profit from the new policy focus and the resultant availability of manpower and equipment for the European Theater".[9] For example, in 1975, Senator Mike Mansfield, an outspoken leader of attempts to reduce US forces in Europe, announced that he would "mount no such drive in the wake of American setbacks"[10] in Southeast Asia. Essentially, the Congressional leadership on NATO issues gradually shifted toward those members who were impressed by the necessity of maintaining a conventional capability in Europe which was militarily effective, and yet, as cost efficient as possible.

In 1974, the first of a series of standardisation measures directed that the "Secretary of Defense assess the costs of the lack of standardisation, recommend corrective actions, and report semi-annually to the Congress",[11] in progress toward standardisation. The Culver-Nunn amendment to the DoD Appropriations Authorisation Act of 1975 made explicit the Congress' support for this objective :

> "It is the sense of the Congress that equipment, procedures, ammunition, fuel, and other military impedimenta for land, air and naval forces of the United States stationed in Europe under the terms of the North Atlantic Treaty should be standardised or made interoperable with that of other members of [NATO] to the maximum extent feasible."[12]

Interestingly enough, the original language of the bill stated that it is to be "the policy of the United States"[13] instead of "It is the sense of the Congress ...". However, this wording was amended when the House and Senate went into conference where the "House conferees, although in agreement with the goal of standardisation ... expressed grave concerns that the import of this language as presently constituted could be misconstrued and possibly used to our disadvantage".[14]

Congress was in itself ambiguous toward progressing standardisation because of the varied interests of its Members.

Nevertheless, the following year, 1976, another Culver-Nunn Amendment to the DoD Appropriation Authorisation Act for Fiscal Year 1977, inserted stronger language which stated it to be "the policy of the United States that equipment procured for [US troops in NATO] should be standardised or at least interoperable,"[15] with equipment of other nations. This act provided for a waiver of the Buy American Act in the larger interest of NATO standardisation, and expressed the sense of Congress that "greater reliance on licensing and co-production agreements"[16] within NATO would facilitate standardisation. Congress also felt that this "encourages the governments of Europe to accelerate their present efforts to achieve European armaments collaboration among all European members of the Alliance"[17] so as to obtain more realistic co-operation in defence procurement on the basis of a two-way street concept.

However, this "two-way street" never materialised. Although the Congressional support for weapons standardisation, armaments co-operation, and military trade on a two-way street was more or less rooted in the belief that such measures would maximise conventional defences and equalise defence burden-sharing; standardisation, arguably, was merely an "economic means to achieve a strategic end, namely to redress the conventional force balance between NATO and the Warsaw Pact."[18] There is also a political dimension of standardisation, to which Congress reacted ambiguously at the outset, and perhaps neither the Department of State nor the Department of Defense adequately communicated that objective to the Foreign and Defence Ministers of Europe. For example, by 1979, the "strategic" purpose of co-operation had receded into the background. This frustrated Congress, the military and industry, and the House Armed Services Sub-committee on NATO Standardisation, Interoperability and Readiness issued a report which "found no redeeming value whatsoever in armament co-operation".[19] The Report said that, "the term 'two-way street' as applied by Europeans and some US defense officials is a political device to secure economic benefits for European industries and often has little or nothing to do with enhancing military effectiveness".[20]

Earlier though, in Europe, the Eurogroup Ministers[21] called in November 1975 for greater efforts to rationalise European armaments planning and collaboration, and laid provisional plans for creation of a staff or secretariat that could collect and collate information on European research, development, and procurement programmes, to better facilitate weapons co-operation within Europe. Following the NATO ministerial meeting of December 1975, an Ad Hoc Committee on Equipment Interoperability was created[22], and the Eurogroup initiative of November gave way to the creation of the Independent European Programme Group in February 1976.[23] The Independent European Programme Group (IEPG) has the distinct advantage in comparison to Eurogroup, of including France as an active participant in European weapons co-operation at the political level. "In its brief life, the IEPG [Independent European Programme Group] has held several series of talks, but has not been able to establish specific projects or come to firm agreements".[24]

To achieve increased Alliance Rationalisation, Standardisation and Interoperability (RSI), the US has undertaken a triad of major initiatives. The first is the Memorandum of Understanding, which has been a principal means of promoting RSI within NATO through co-operative action. The Department of Defense enters into reciprocal defence procurement and offset agreements with NATO, individual NATO governments, and other friendly governments, to purchase and sell defence equipment. The objectives of these agreements may be of a general nature, for example, to provide for waiver of the "Buy National" restrictions; or to promote greater co-operation in research, development, production and procurement, to enhance standardisation and interoperability. The different types of Memorandum of Understanding (MOUs) are :

- <u>General and Reciprocal Procurement MOUs</u> which essentially have the theme of eliminating barriers such as "buy national", and import tariff penalties, and opening defence markets to competition on a reciprocal basis.

- <u>Umbrella Type Research and Development MOUs</u> which are agreements with such countries as the UK, Italy, Germany and the Netherlands. This occurs where the Secretary of Defense has issued blanket waivers of the "Buy America"[25] for those countries with which the US has reciprocal Procurement MOUs.

- <u>The Program Specific MOUs</u> which differ from the General or Umbrella MOUs in that they only provide overall guidelines regarding programme objectives such as reciprocal or fair opportunity to participate in production agreements. A specific MOU is usually required to cover each particular programme. For example, in the case of the F-16 a specific MOU was signed in 1975 by the US, Belgium, Denmark, the Netherlands and Norway relating to procurement, co-production and offset arrangements of the aircraft. A way of viewing all this is that each General and Reciprocal Procurement MOU sets the tone for reciprocity, but often the details must be presented in separate technical agreements, which perhaps might cover financial arrangements, cost sharing, or additional co-production.

Thus, industries almost always require licences to manufacture parts, components, or other items. Industrial "know-how" or other technologies may be released to a foreign manufacturer with the appropriate restrictions on their use. These and other agreements (quality control, inspections, <u>et al</u>) are contained in technical agreements which are appended to the MOUs. Some examples of Program Specific MOUs are, Co-Operative Research and Development, a method by which governments co-operate to make better use of their collective resources to include technical information exchange, research, development, and agreement on standards. Another example is the Co-operative Test and Evaluation which allows one government to test and evaluate the performance capabilities of a system before buying, or, a government might wish to participate in the tests to obtain additional technical and operational data. Another example of a Program Specific MOU is Co-production. This is the type for the case of the F-16, where a specific co-production agreement occurred when Belgium, Denmark, the Netherlands and Norway decided upon the F-16 to replace their ageing F-104s and other aircraft. As a consequence, a MOU was negotiated providing for European industrial participation in F-16 production.

The second of the triad of major initiatives undertaken by the US to promote RSI is by dual production or co-production of developed, or nearly developed, systems. Under this approach, a nation that has already developed a system which is valuable to the alliance would permit others to produce this system, and thus avoid the undertaking of redundant developmental programmes. Here again, the case of the F-16 comes to light when the US and the four European governments signed an MOU for the F-16 Multinational Programme. The Europeans, who teamed with the US for the co-production and co-assembly of the F-16s, produce avionics, the engine, and the aircraft.

The last element of the triad is the concept of the family of weapons. It is a relatively new approach for promoting arms co-operation. Essentially, there is the belief that some of the shortcomings of individual weapon system collaborations can be eased or overcome by a collaboration that encompasses several systems in a specific functional or technological family.

Before applying this background information to the case of the F-16, another suggestion is offered. In theory (and in some cases, in practice, for example, F-16), the triad of initiatives are to promote RSI. The real task is that each of the approaches involves the sharing of technologies, which hampers their effectiveness. Moreover, this is complicated by the fact that the agreements are between foreign governments and not between a foreign government and a contractor in another country. "The United States has a conflict between its desire for increased NATO collaboration to standardise weapons and the need to maintain control over weapons systems made from US technology. These two policies may not be able to co-exist if the United States is to move forward in standardisation".[26] The conflict is well founded. It is the product of the "importance of exports to the major European producers; different foreign policies and arms sales exporting patterns of the United Kingdom, France, and the Federal Republic of Germany; the inability of the UK, France and FRG producers to compete with the US".[27] Aside from this, a GAO classified report on NATO collaboration in an unclassified digest boldly states :

"For all major producers, exports fill both foreign policy and economic goals. Because transfer of weapons adds to the military capability of the recipient, all the producers treat arms exports as reflections of their foreign policies, and all look to exports to create economic benefits - to lower the unit costs of the national purchases, to earn foreign exchange, and to solidify economic relations with the recipient."[28]

Instead of "openness" in the sharing of new technologies, such attitudes have actually retarded RSI. An exchange of technology under the restrictions imposed by a Specific MOU can become a tool of leverage. (For example, if new stealth technology should be transferred to the UK for a new future bomber, that technology is under restriction. This would forbid the UK, if suppose she should develop new designs and graphite materials, from applying it to the British fleet of helicopters. Again, that would have to be negotiated under a separate Specific MOU by government to government). Thus, "useless and needless duplication of effort in NATO can result from any conscious hiding of technology discovery among NATO allies. For propriety reasons, using military security as an excuse, nations seem to hold back the work of greatest consequence so as to establish a national product position."[29] This becomes further complicated when taking into account that the new technologies are the resultant of the collaborative effort of the DoD Components and the contractors. Thus, there appears to be a two-tiered approach to RSI - namely that of a government to government competition to protect technologies and yet, at the same time, from the viewpoint of the contractors, there appears to be co-operation in competing for new technologies. The notion of DoD Components or professional bureaucrats versus the managers as politicians in their approaches to decision making is applicable to agreements between contractors compared to agreements between two governments. For example, "US firms co-operated with French and Swedish prime contractors in competing against the US F-16 and F-17 aircraft, before the F-16 was chosen".[30] Although Northrop lost to General Dynamics, after their (GD) win, they were not in the position to make foreign sales. "90 percent of US foreign military sales are via government to government agreements, not by agreements between foreign governments and US contractors".[31]

It is the opinion herein, and also as a topic of further research, that Western Allied governments appear to be in direct competition with each other, while Western industries seemingly co-operate with each other in global arms markets. The point is, that during the non-hardware phases, contractors are researching new technologies and exchanging information. However, when money and resources are involved during the hardware phases, a competition with political dimensions based on economic criteria, pressures governments into a competition which is justified on the grounds of national security.[32]

NATO Sale and the Co-production Programme of the F-16

In June 1975, after 13 months of evaluation, the European Participating Governments (EPG) - Belgium, Denmark, the Netherlands and Norway - selected the F-16 aircraft, from among the Swedish JA-37 Viggen, the French Mirage F-1/M53 and the US Lightweight Fighter Prototypes, YF-16 and YF-17, as a replacement to modernise their current fighters. To capture the market, various strategies were pursued by the contractors - some illegal, to persuade the European Participating Governments (EPG). Also, other strategies with tangible offerings were pursued, for example the Belgian gun purchase.

Regarding the loss of business integrity on the part of the contractors in promoting their aircraft, the capital cities of the European Participating Governments (EPG) were awash with rumours of bribes et al, or claims and counterclaims of money passing from one hand to the next, to promote a certain contractor. The stakes being so high - $2 billion for the European sale and over $15 billion for the total market - it was not surprising for such events to have occurred. Also, eventually the US government appeared to play dirty ball or "steamrollered" the project.

In the earlier stages of the F-16 programme, it was contractor versus contractor battling to receive the support of the EPGs. However, as the choice of the F-16 over the F-17 drew closer (chosen on 13 January 1975), the competition shifts and becomes a competition between governments.

For example, before the F-16 was selected by the US Air Force, Piet Denkert, a Dutch Member of Parliament, who at the time was a ruling Socialist Party spokesman for foreign affairs, charged that he was "offered the equivalent of $1 million by a French agent to speak out in favour of one of the F-16's chief European rivals".[33] Another Dutch Liberal Parliamentarian, Mr W. Keja, charged that the French tried to bribe him into taking their case to the Dutch second chamber (House of Representatives). As he said, "I was telephoned by a French agent [Joop Botterman] who invited me to lunch. He said he would give me 30,000 guilders (about $10,000) if I would speak out in favour of the Mirage. I said I couldn't accept".[34] Dassault meanwhile denied all allegations of bribery and demanded a chance to debate on television. Mr Piet Denkert (who made the earlier allegation) agreed to debate M. Pierre Francois, General Secretary of Dassault. "In other countries" M. Francois said, "such practices may exist, but not here in Europe, surely".[35] For more discussion of some of these contractor actions, <u>see</u> Ingmar Dorfer's account in his book, "<u>Arms Deal - The Selling of the F-16</u>".[36]

By retracing some of the developments in greater detail, demonstrates the increase of the political activity regarding future co-production. Thus it is necessary to return to when the NATO countries had agreed to try to co-ordinate their selection. Although Washington had remained uninvolved in the events of Europe until then, afterwards at the State Department, Henry Kissinger became involved and a message from him to the Defence Ministers of Norway, Netherlands, Denmark, Belgium, sent on 26 February 1974 conveyed the following :

- European collaboration to expedite the development of certain aircraft components;

- Support the transfer of air technologies; and

- Provide logistical support for those program components.[37]

The impact of the message was clear. The Secretary of State was personally involved. Also involved was Secretary of Defense Schlesinger who, anticipating a European meeting on 2 May, wrote a letter to the four Chairmen of the Congressional Armed Services and Appropriations Committees on 27 April 1974 which stated :

> "While we clearly have not made a final decision to put into production of the ACF, I am convinced that the continuing need for modernisation not only of our tactical air forces but also those of our allies re-emphasises the importance of making available a lower cost fighter option ... I forsee significant potential for foreign sales of this type of aircraft particularly if we fully support such a program."[38]

The significance of these events was threefold : first, the seeds of the politicisation of the programme had been sown, just prior to production (large amounts had already been appropriated by the Congress and from the SECDEF for R&D and prototyping since FY 1972). Second, the emphasis from the State Department was on co-production. Third, the emphasis from the DoD was for foreign sales - one argument for foreign consumption; the other for domestic. But most notable of all by mid-August 1974, a team headed by the Deputy Secretary of the Air Force for Installations and Logistics, Frank Shrontz, went to Europe to continue the negotiations - the import was in the composition of the team - neither the Defense Assistance Security Agency at DoD, nor the State Department, were to direct the negotiations from now on. "The Air Force in fact and the DoD in name was to make sure that the Europeans selected the USAF air combat fighter as their own."[39]

However, after the choice of the F-16 had been made by the US Air Force, US government spokesmen (managers/politicians) took control of the situation. Even the Secretary of State, instructed the American embassies in the European purchase countries to assist in the sale of the F-16, which led to what one American diplomat in Brussels termed "an effective demonstration of industrial-government partnership".[40] A European aircraft industry official called it "a steamroller".[41] The timing of the appearance of President Ford, 29 May 1975, to address the NATO Council, was also a consideration. If it were just a coincidence, the contents of his speech were not. Although President Ford never singled out the F-16, one of the serious problems about which he expressed concern was the increasing pressure on Alliance members to reduce their levels of military commitment at a time when "the forces of our potential enemies are continuing to grow stronger".[42] This combination of "increased strength on the part of our adversaries and greater national demands for resources for non-defense needs makes it imperative that we use our defense resources more effectively".[43] To this end, President Ford stated that the Alliance must, "become truly one in our allocation of defense tasks, support, and production" and challenged the Council to achieve "our longstanding goals of common procedures and equipment".[44] The success of these standardisation "efforts will be an important element in maintaining a strong and credible NATO defense posture".[45] Furthermore, as witnessed in the previous Chapter, pressure was also applied by the Secretary of Defense, Schlesinger.

Aside from the bribery allegations of the contractors and the political pressures exerted by one government on another, tangible outputs were in the offering. For example, as mentioned earlier, Schlesinger by having authorised the Belgian gun buy, had arranged the final sweetener to persuade the Belgians to choose the F-16. However, a far more important inducement for all of the European Participating Governments (EPG) was in the works. This offering came from the Pentagon in clinching the deal and is referred to as "offset". Essentially "offset occurs, weapons traders explain, when one country buys something from another country to persuade that nation to buy something from it in return".[46]

Defense Secretary Schlesinger described the deal as allowing the Europeans to recoup "at least 100 percent or more of the value of their initial production".[47] Or, on the other hand, as a writer from the Chicago Tribune put it, "the Europeans get 348 free jets worth $6 million each".[48] When the final pact had been drafted, in June 1975, the EPG entered into a Memorandum of Understanding (MOU). This agreement called for the EPG to share in the production of the European, US and third country aircraft on the basis of EPG industry receiving contract awards. The Europeans received :

1) Assembly plants to be built in Belgium and the Netherlands, where 40 percent of the 348 planes sold to Europe will be produced;

2) the Europeans will produce 10 percent of the 650 F-16s the US Air Force had ordered;

3) sales to any third nations would also mean profit for the Europeans. The two European plants will produce 15 percent of all aircraft to be built for sales outside the US and the EPG.[49]

Captain Robert Carroll, a spokesman for Assistant Air Force Secretary Frank Schrontz, indicated that the final selling point, which most likely turned the Belgians around, was the consideration that even with the exclusion of the third country sales, Belgium's entire cost for the F-16s would be offset. Further, "if third country sales exceed 1,000 planes, the European assembly and production plants could realise a profit of well over $500 million. They could actually make up to 130 percent of their original cost".[50] Or, as Brigadier General James Abrahamson, USAF, said, "The ultimate goal of the program is to place certain F-16 production business in Europe to offset 100 percent of the cost of the Europeans' initial buy of 348 aircraft. The 100 percent offset is to be completed with the sale of 2,000 aircraft. This buy represents about $2-3 billion measured in 1975 dollars. The offset goal is to be achieved in phases based upon the total number of aircraft produced, for example, 58 percent of the Europeans' outlay is to be offset during the production of the first 998 F-16 aircraft (650 US, 348 European) and the target of 100 percent offset should occur when 2,000 aircraft have been produced".[51] Obviously, nothing being for free, someone or some government would have to absorb the costs elsewhere.

Costs of Co-production

On the other side of the Atlantic, a half-year before the US Air Force selected the F-16, Otto Glasser, vice-president-international of General Dynamics, projected that should the F-16 be chosen, because of the co-production effort and by virtue of the increases of units and applying the learning curve, the "price per unit would be in the $4.5 - 5 million range".[52] A month after the selection of the F-16, "the US prime contractor [General Dynamics] agreed to a not-to-exceed price of $6.09 million in 1975 dollars",[53] per unit. The unit flyaway price was actually set at $5.16 million in 1975 and General Dynamics was not to exceed $6.09 million. The following year in May of 1976 a staff working paper from the Department of Defense projected that, due to the co-production effort, the F-16 would save a total of $126 million in Fiscal Year 1977 through 1981.[54] See, table below :

Estimated Future Savings FY 1977-81 (in $ millions)

	Total Savings	R&D	Learning Curve	Overhead
F-16	126	67.7	43.7	14.6 [55]

Also in May of 1976, US Air Force Col. William E Thurman, the F-16 system programme director, told the Senate Armed Services Tactical Air Power Sub-committee that, "The United States stands to recoup its entire investment in development funds through co-production and foreign military sales".[56] To lessen any fears in Congress of a breach of security or if a crisis should arise, Thurman said, "We shall retain the ability to produce all of the aircraft in the United States, should the need arise".[57] By June of 1976, the price had climbed from $5.16 million (January 1975) to a fixed price of $5.69 million - not much of an increase - $530,000 in one-and-a-half years. However, "Defense officials of the four European Participating Governments were concerned that the increase would eventually threaten the fixed ceiling price of $6.09 million"[58] per unit. They would never have imagined that by 1981 Congress agreed to buy "120 F-16s in FY 1982 for $2,330.3 million!."[59] Simple arithmetic shows the cost to be $19.41 million per unit, or, a 376 percent increase from when the contract was first negotiated in 1975. Of course, one reason for an increase of such a price would be inflation. However, for the period of 1975-1981[60], the total rate of inflation in the US was 64.3 percent, still leaving a 311.7 percent increase to be accounted for. The Heritage Foundation, a conservative think tank in Washington DC, prepared a study depicting that for 28 weapons systems conceived in the 1970s, "the Pentagon estimated that inflation would increase costs from 9 to 100 percent. In reality, inflation and design and program changes, plus the added costs of unstable production, increased costs by many times that estimate, from a minimum of 92 percent to as much as 400,500 or even 800 percent".[61]

It was envisioned that co-production would increase the orders and bring down the cost. To the "Americans, this program is a pragmatic arrangement for the US foreign military sales program to win over European competitors for export sales of tactical aircraft".[62] However, the desire here is to argue that the co-production effort itself, was actually an additional reason that costs of the F-16 programme were increased. First, there is the geographical aspect. The closer one's proximity is to another contractor, the lesser the costs (shipping, communication, travel, et al). Thus, having sub-contractors (see Appendix 3) on both sides of the Atlantic would drive up costs. Although these factors may increase costs, those increases, as illustrated domestically in the US, are negligible if they become necessary for the award of the contract. Perhaps this type of cost overrun should be classified as operating costs. Also, there is a cost on either side of the Atlantic due to the fluctuation of currency exchange. The "loss due to currency conversion is an element of the F-16 multinational program over which the program manager has no control".[63] Furthermore, there is "less competition in Europe - differences exist with respect to competition in defense acquisition".[64] Such factors as "wages, which are higher in the US than Europe, and Europe's taxes higher than the US; the personnel in Europe are more craftsman product oriented than US technicians who are machine oriented; higher union orientation in Europe leading to less flexible and slower work schedules than in the US; vacations in Europe where plants shut down versus the individual preference to vacations in the States, are just some of the cultural and/or historical differences which frustrate savings in production costs".[65] "Costs in the proposals are coming in much higher than the US anticipated, and it is a serious problem. The Europeans are increasingly non-competitive and seem unable to sustain a production rate that will allow them to compete with US aerospace firms. It is almost across the board; just pick a proposal on an F-16 component and look at the price for co-production".[66] Relating co-production as a reason for cost overruns, one cost analysis found that as a "result of co-production, the Europeans are spending approximately $1.1 million more on each aircraft, while the US is, in effect, absorbing part of the cost of co-production and paying about $150,000 more per aircraft than it would without the European sale".[67]

A second and more important reason for the cost overruns on the domestic side, but with consequences for the European co-production effort was suggested earlier. It was stated that, DoD Components are as optimistic in their appraisals of costs in the earlier stages of a weapon system's development as are the contractors. In most headlines, blame tends to be passed on to the contractor, which is only half the truth, because not only is the DoD Component optimistic in its assessment, but given the time and organisational facets of the Fiscal Cycle (as well as its overlap) the DoD Component can use this to its advantage. The case of the F-16 substantiates this. "The cost estimates presented at DSARC III [Defense Systems Acquisition Review Council] were not approved by OSD [Office of Secretary of Defense] until the budget review cycle was completed in December 1977".[68] Although DSARC III costs are subject to changes, "they represented the Air Force's best estimate at that time and, we believe, should have been presented in the September SAR [Selected Acquisition Report] as an Air Force estimate not yet approved by OSD. Otherwise, the Congress is not notified of potential program cost growth in a timely manner."[69] The F-16 programme cost estimate prepared in September 1977 and briefed to DSARC III in October 1977 and the September 1977 SAR itself are shown below :

Total Program Cost
(in millions of dollars)

Program	SAR 30 Sept 1977	DSARC III Briefing	Increase
Development	891.1	1,004.9	113.8
Procurement	12,942.2	14,142.3	1,200.1
Total Program	13,833.3	15,147.2	1,313.9

[70]

Certainly, Congress should have been informed of an increase of $1,313,900,000 when DSARC was already aware of the increase. However, this is not the full picture. The above General Accounting Office Report to the Congress was dated 24 April 1978, but a half year earlier a letter sent by Mr Gutmann, Director, Procurement and Systems Acquisition Division of the General Accounting Office, to General Lew Allen, Jr, Commander, Air Force Systems Command, stated that "indications are that the F-16 program cost will increase".[71] The letter proceeds then to itemise the Armed Services Procurement Regulation which required that "contracting officers [DoD Components] obtain cost or pricing data from contractors to report proposed prices for such negotiated non-competitive contracts expected to exceed $100,000. Contractors are required to certify that cost or pricing data used as a basis for negotiating contract prices is accurate, current, and complete".[72] General Dynamics complied with, and executed the required certificate as of 8 January 1975. However, "the Air Force did not strictly follow Department of Defense Regulations which provide that where cost or pricing data is obtained, a cost analysis shall be performed to assure the reasonableness of the price proposed ... No alternative methods of evaluation are authorised. In our opinion the departure from procedures developed over the years to increase assurance of negotiating fair and reasonable prices for needed goods and services was not warranted."[73]

Aside from the importance of the letter regarding cost overruns, it also verifies that, by law, contracting officers and contractors should work together to arrive at a reasonable cost. To achieve a sound cost analysis for a non-competitive contract, both elements have been working closely together for quite a period of time, in researching new technologies and applying it to match the requirements. Further, the DoD Components have been assessing materiel, resources, technology, et al, and reporting upwards, and at the hardware stages of a weapon system, they are probably just as eager as the contractor, for different reasons, to be overly optimistic. Perhaps the reasons might not be too different remembering that many in the military "retire" at an early age and enter into private employment.[74] Nevertheless, an Air Force Component should have been held accountable, for the letter also stated "that the decision to award the contract in January 1975 instead of the originally planned contract award date of May or June 1975 ... may have contributed to the Air Force's lack of strict compliance with established regulations and procedures in awarding the contract".[75] An excuse or outlet was provided to the Air Force perhaps due to the notion that very few comply. For example, "the Program Objectives Memorandum (POM) in almost all major force programs reflects unbridled optimism unsubstantiated by either an analysis of the economic and budgetary environment".[76]

Another aspect of the cost overruns of the F-16 was the contract on its own - a fixed-price, incentive fee contract was offered by the US Government to General Dynamics. The US offer was a "not to exceed" price of $6.09 million with General Dynamics setting its price at $5.16 million per unit. The "not to exceed price is only an upper limit; if the aircraft can be produced at a lower price, the lower price will be charged".[77] From the viewpoint of the Government, the "fixed price, incentive fee" contract "ensures that the manufacturers have an interest in the lowest possible costs".[78] A suggested argument is that such contracts are an impetus to cost overruns, since the contractor could add an amount on to the originally agreed price, and still be below the ceiling, and receive an incentive fee. As a staffer on the Senate Armed Services Committee once said, these "contracts allow the contractor to make up for its lies in the past".[79]

Before turning to a discussion on the production and deployment of the F-16, some issues should be mentioned as to whether or not the F-16 was/is a co-production effort. It was a co-production effort in the sense that other NATO countries participated in its production, which may have benefited RSI. However, the political gains of promoting RSI were not the only reasons for entering the co-production effort. "It seems reasonable to conclude that the F-16 project ... was how the Europeans could reduce their military technological dependency on the United States".[80] The technological level in modern armaments and the ability to achieve a high level is crucial in the maintenance of a competitive industrial base. The Europeans wanted to participate to a greater degree than was finally permitted in the detailed engineering of the F-16 - such was denied on the grounds that that information should be kept in the US. "Technology concerning four parts of the F-16 were not released: the radar processor, the electronic countermeasure equipment, the fire control system and the hot section of the engine".[81] Regarding this, Frank Shrontz, Assistant Secretary of the US Air Force, stated :

> "At some point in time when the technology ceases to be sufficiently advanced ... they ought to have the full capability of a joint program. They like to think that they are meaningful participants in the program, and I must admit it rankles them a bit when we withhold certain things that we think are important for our own security."[82]

This raises the fundamental issue of a "two-way street" and as to whether or not this was pursued in the interests of RSI. The suggestion offered here is that in the case of the F-16, "commonality" was more sought after to enhance not only sales, but to lessen the vulnerability of the entire programme by increasing the political stakes, should, say, Congress not agree to funding. And, the political ante would increase each year as the programme would continue and begin to materialise. Had the US developed the programme entirely on the basis to promote RSI, it would have been unnecessary for the US to keep a complete production run in the US, even though this results in higher costs than single source production. The contention here is that the European interests in a successor for the F-104s, and the prospects of the European market, aided the Air Force and Pentagon in deciding on a production programme for the F-16. This assisted the Air Force and the Department of Defense in obtaining funds. However, their arguments of offset costs and learning curve implementation with a larger order have no merit. (For the last time, and for the purposes of emphasis, the author wishes to suggest that) those involved in the weapons acquisition process apply their own learning curve, and set themselves on a straight path, by realising that in weapons procurement the learning curve argument is only a political ploy to either "tool up" a project, and reach a threshold, whereupon it makes more economic sense to maintain that programme than re-shape it, or to secure funding for a larger number of units. Originally, the Air Force projected 650 aircraft for the US and 348 for the four NATO countries - a total of 998. In March of 1982, the order, with foreign sales and an increased US order (1,396), stood at 1,997 planes. The original programme in 1975 per unit was to cost $5.16 million or, in 1982 dollars, $9.2 million. However, with a doubling of the orders by 1982, the unit cost of the low cost fighter was now $21.2 million![83]

Production Gets Under Way

The Memorandum of Understanding (MOU), the basic charter for implementing the F-16 multinational programme, was finalised on 10 June 1975, six months following the selection of the F-16. The major commitments were issued through the Office of the Secretary of Defense, and not through the

Air Force. These commitments were subject to Congressional authorisation and appropriations, and were as follows :

- Procure 650 F-16 aircraft and base a large number in Europe;

- Manage the F-16 multinational programme;

- Utilise depot maintenance and overhaul facilities established and funded by the European Participating Governments (EPG) and industry in these countries on a mutually agreed basis for USAF F-16 aircraft operated in Europe;

- Release most elements of the F-16 aircraft for technology transfer, "except certain specific ones that will be released later";

- Provide for EPG industrial participation in F-16 production to offset EPG procurement costs.[84]

The fifth commitment relates to the percentages mentioned earlier, that the Department of Defense directed the F-16 contractors to place with EPG industry :

- 10 percent of the procurement value of the 650 US purchase;

- 40 percent of the procurement value of all EPG aircraft programme purchase;

- 15 percent of the procurement value of all third country purchases.

The European Participating Governments' (EPG) representatives made the following important commitments for their Governments :

- Purchase 348 F-16 aircraft;

- Pay for all material and services necessary to their programme, and fund a pro rata share of the programme costs as required for acquiring production long-lead items and production implementation;

- Pay a pro rata share of US Government non-recurring costs for developing the F-16 aircraft system;

- Fund development and production costs for equipment peculiar to their aircraft.[85]

Although the US Government is ultimately accountable for the overall management of the multinational programme, and the European Governments are responsible for theirs, the key elements for the implementation and decision making of the programme remain the responsibility of the DoD Components and the contractor. The management of the F-16 programme is co-ordinated through the US Air Force's System Program Director (Programme Manager) for the F-16. He is advised by a Steering Committee.

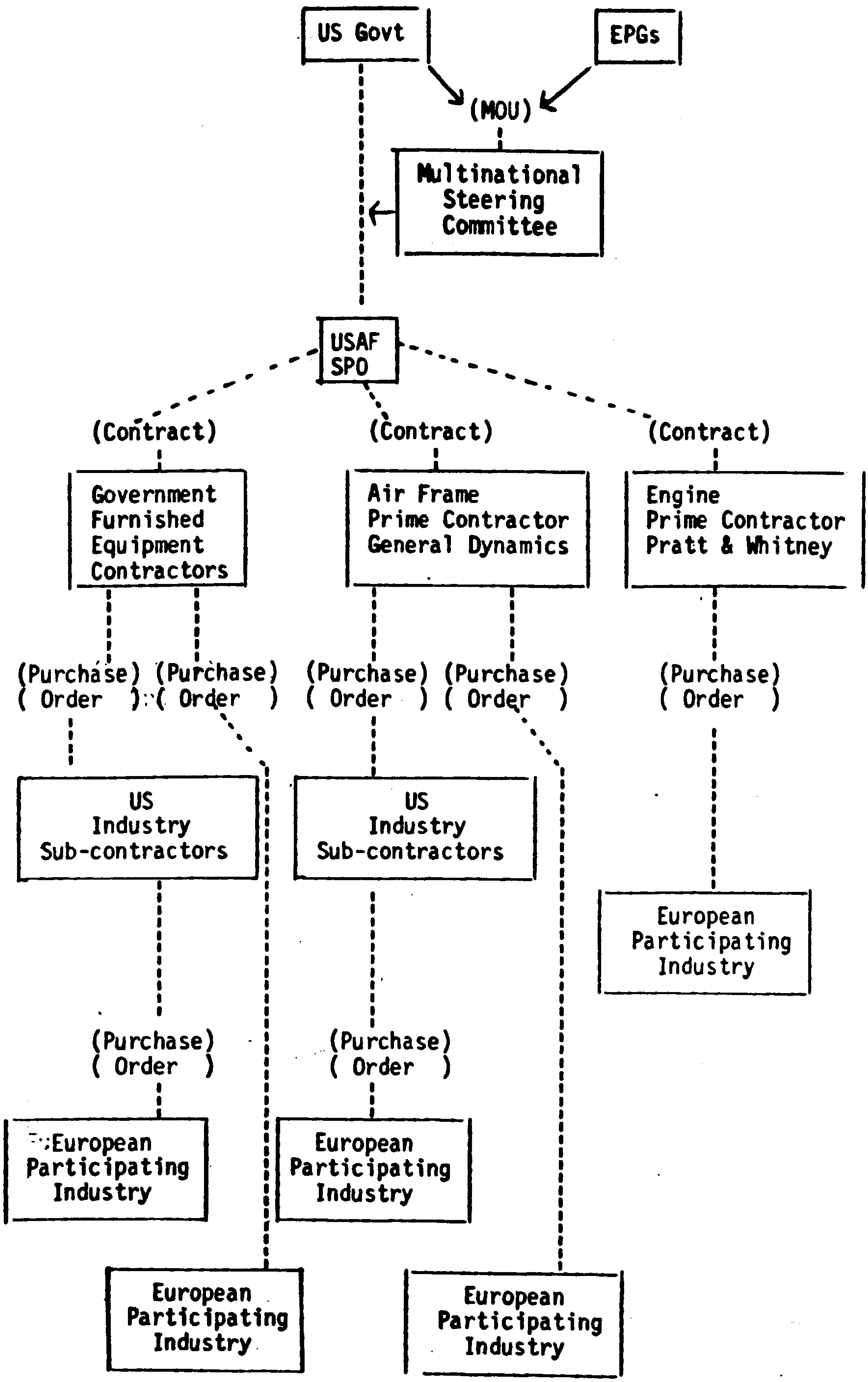
The MOU established a Multinational Fighter Program Steering Committee, composed of one principal member and one alternate member from each participating nation. The committee meets periodically to resolve issues and to provide advice to the US Air Force's System Program Director. However, if the Steering Committee is unable to reach a decision, then the US Secretary of Defense may be asked to resolve the issue. The Steering Committee has also established sub-committees to monitor specific areas and make recommendations for resolution of disputes. The Steering Committee has also set up a full-time permanent Secretariat in Brussels, Belgium.[86]

General Dynamics Corporation is the prime contractor for the F-16 airframe. It is responsible for the design, development and production of all F-16 aircraft and, except for engine performance, for total system performance, including all airframe co-production work. Pratt and Whitney, the engine prime contractor, is responsible for all F-100 engine performance, including those engines assembled in Europe. General Dynamics' sub-contractors also established co-production programmes with EPG industries for aircraft components. A way to view the organisational structure is set out in Figure 7-I.

The purpose of this is to illustrate that during the hardware phase (Full-Scale Development and Production and Deployment), the decisions, in contrast to the earlier stages are now increasingly directed from above, as well as, working in an upwards fashion to other successive levels. For example, an increase in orders of the F-16s is negotiated between Governments. Once the order is confirmed, it is then passed on to the Steering Committee and the System Program Director. Then it makes its way, through new contracts with the prime contractors, who in turn place purchase orders with sub-contractors, which presents quite a different picture from the non-hardware phase of conception. Meanwhile, should the programme experience engine problems, or poorly designed avionics, those decisions and most other routine decisions are made by the DoD Components on a continuous basis.

Figure 7-I

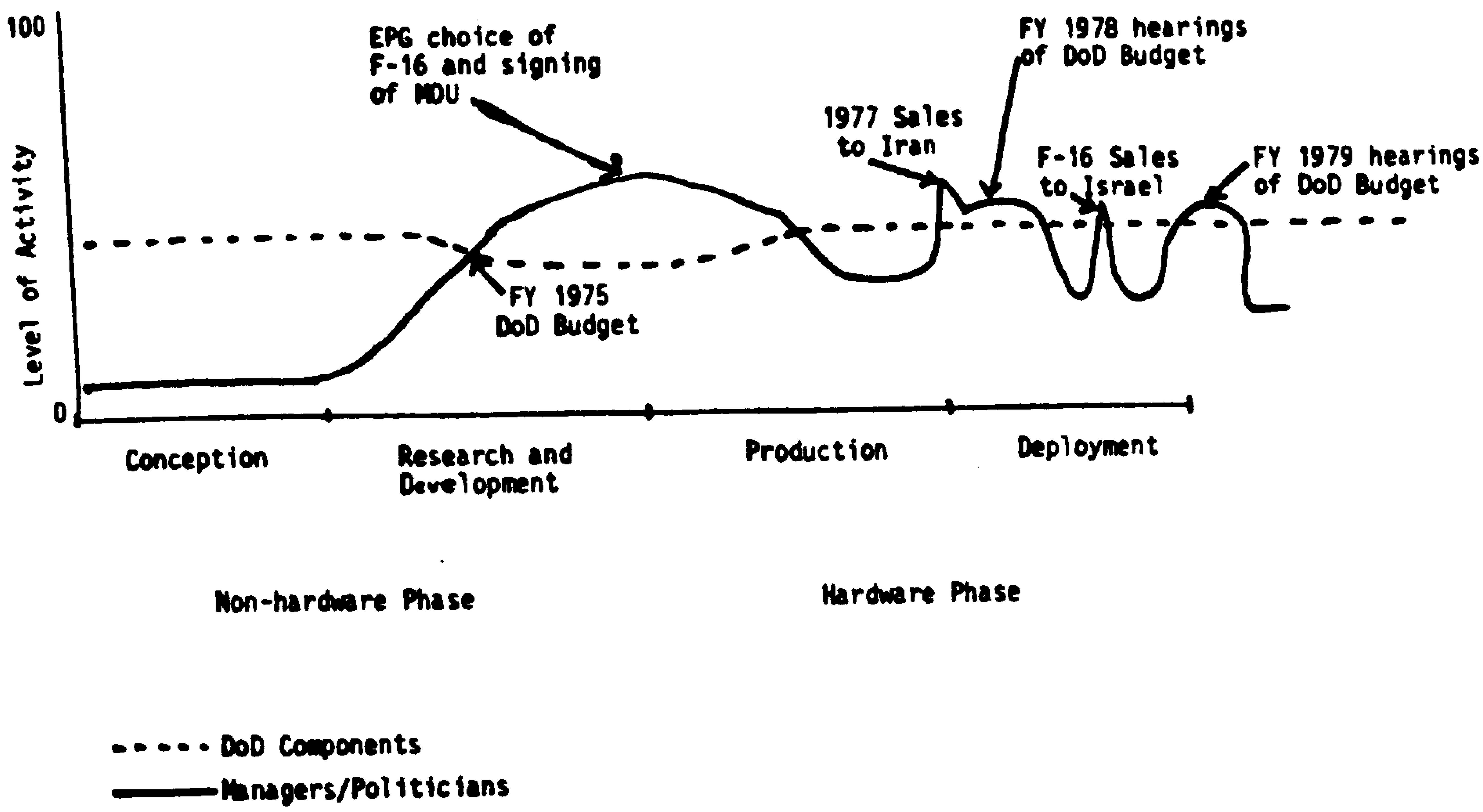
Structure of the F-16 Co-production Programme



Although the diagram portrays an organisational system with decisions working their way downwards, this should not be confused with the overall acquisition system when it was witnessed that decisional centres shifted upwards as the programme was moving into and through the hardware phase. Prior to that, decisional centres were to be found at lower levels, DoD Components, than at the higher levels, Secretary of State, Secretary of Defense, and the JCS. However, the shift upwards occurred when the survival of the programme was at stake - in other words, when funding was necessary to produce the aircraft. Once the funding had been realised and the programme was now more secure following the efforts of the SECDEF, Secretary of State, and the President, a Memorandum of Understanding was agreed to linking the concerned nations in a co-production effort. Once this had happened, the decisional centres again shift, but not only in the direction which they were once. On the one hand, once the political manoeuvring has settled down - the jobs of the managers complete - there is a shift downwards as the weapon system enters production and deployment. However, on the other hand, for the yearly funding required, those with the political skills are again called into action to secure the funding. Further, issues such as sales to third countries, production problems with the governments of the EPGs (not production problems with, say, General Dynamics and Fokker-VFW), Congressional scrutiny over cost overruns, and so forth fall within their domain. In essence, at this stage of a weapon's life, the decisional centres are two tiered : one tier concerned with the life of the weapon system, its performance, scheduling of tests, bettering technology, <u>et al</u>, whilst the upper tier is concerned with politically sensitive issues, such as yearly funding, sales to Iran or Israel, high costs. If a value could be assigned to the weight or influence of decisions, the following diagram, although impressionistic, illustrates how the two decisional centres interact with one another.

Figure 7-II

Activity of DoD Components versus Managers/Politicians



Although dates have been supplied concerning the F-16 programme as examples, if supposing the events of the F/A-18 programme were supplanted, perhaps the diagram would appear similar. Although the diagram is provided purely as a hypothetical attempt to view the overall decisional process, it has been shown otherwise that the behaviour and influences of the DoD Components is more steady throughout the life of a weapon system. It is no wonder then, that contractors striving to lessen the uncertainties ahead of them, would prefer to do business with the Components. Actually, the preference is not really theirs, considering that it is the organisational process which has created the environment for the contractors to work within. Some further discussion of the production and deployment of the F-16 is necessary, and also a brief discussion of some of the foreign sales to illustrate the activities of the two decisional centres. Before this discussion, a most significant point must be suggested.

If the activity of the DoD Components and the managers in the above illustration is proven as such, then an examination of decision making, regarding weapons procurement, must consider not only the organisational processes and the influence one might exert upon the other, or the outside influences and events which may result in a change of course, but also where the decision is taking place. Furthermore, it is necessary to be aware of where, or from which decisional centre, the decision is emanating, or which of the two is exerting more influence than the other, and why, at a certain point in time of a weapon system's life. This approach would help to divorce some of the political rhetoric from the decision. Thus it would be easier to ascertain whether a decision was politically or militarily motivated, or a combination of both, depending on which centre, and at what stage in its life the weapon system is resting. For example, the F-X and F-XX studies were more militarily oriented than politically; Congress' push for commonality of Air Force's and Navy's aircraft programme in hearings for FY 1975, and the instructions inserted in the Budget for FY 1975, was more politically motivated than militarily, especially with the knowledge that the Navy's and Air Force's needs differed in the type of aircraft. The decisions to include the four European nations were both politically and militarily sound, thus, promoting the "two-way street" and enhancing the standardisation of aircraft in Europe and the US. All of the above decisions would have economic consequences, whether positive or negative, depending whether it is from the viewpoint of the contractor, the DoD Components or their managers, the Congress, et al. The intentions or consequences would differ, in accordance with whose best interest was at hand. It is naive and counter-productive to decision making, when the decisions are viewed with myopia, and theories such as a "conspiracy of the military-industrial complex" or "weapons simply mean jobs" are applied. Those theories are only part of the complete picture, and realising that the decisional centres are shifting during the development of a weapon system might provide a more clear image of the decision making process in weapons procurement.

Production of the F-16

Regarding the shift on the one tier downwards, the agreement on the part of the Europeans was finalised on 10 June 1975, after Secretary of Defense Schlesinger reached agreement with Defence

Minister Paul van den Boeynants of Belgium, "promising to consider favourably an order for $32 million worth of submachine guns from the Belgian national arms factory",[88] amongst the offset pledges. The agreement was in the form of a MOU, signed by the governments' respective Defence Ministers which detailed offset costs and the amounts of aircraft on order at that time: 650 for USAF; 348 for Europe - Belgium, 116; The Netherlands, 102; Norway, 72; and Denmark, 58. There was also agreement that of the 348 European aircraft, 184 were to be assembled in the Fokker plant at Schiphol, in the Netherlands, and 164, by SABCA, at Gosselies in Belgium.[89]

Preliminary contracts for the F-16 were placed in 1975 with European industry. It is impractical to detail all of the suppliers in a programme of this magnitude, however, the major contractors were as follows : (See, Appendix 3 for all European Contractors.) The two aircraft assembly lines are set up at Fokker, who produce the airframes for the Netherlands and Norway, and at SABCA where the Belgian and Danish airframes are assembled. At the same time, the Belgian company SONACA (formerly Fairey SA) having been reconstituted with new management, is contracted to build the aft fuselage.[90] Other components such as the wings and centreline pylons are built in Denmark by Per Udsen, while the undercarriage is built by DAF in the Netherlands, and the wheels by RauFoss in Norway.[91] European assembly of the F100 engine is handled by the Belgian company Fabrique Nationale. Kongsberg of Norway builds the engine fan drive turbine module, while Phillips in Holland is responsible for the augmentor nozzle module.[92] Contracts for avionics are also widely scattered throughout the four nations : MBLE of Belgium has overall responsibility for the APG-66 radar, while Signaal and Oldelft of the Netherlands are responsible for the radar antennae. Also involved in the avionics is Kongsberg of Norway and the Danish company Ner Lindberg handles the inertial navigation system as well as in other contributions.[93] Indeed, it is a truly international effort to produce the European F-16s.

To fully appreciate the magnitude and complex management involved in the task, in 1977 there were more than 3,000 suppliers and sub-contractors involved in the programme, and under the 998 planned aircraft production run, some "20,000,000 lbs of raw material and three million individual manufactured items were due to cross the Atlantic".[94] The programme director, Brigadier General James Abrahamson, described the task he faced as a "management nightmare".[95] General Dynamics, the prime contractor for airframe design and performance, and Pratt and Whitney, the prime contractor for the engine, were responsible for entering into these sub-contracts under the direction of the European Systems Program Office.

On 28 September 1975, the Air Force (and not the Secretary of Defense) announced that the F-16 European Systems Program Office in Brussels had begun operations. "The office will supervise and manage the day-to-day operations of the five nation portion of the co-production arrangements for the aircraft."[96] European personnel from the EPGs were integrated into the Brussels office and also into the System Program Office at Wright Patterson AFB in Dayton, Ohio. "These offices will be responsible for logistic support, planning, production management, certification management, and engineering".[97] This office was responsible for trying to bring the whole process together, so that a common hardware would be produced by all of the participating nations. Before components and aircraft could be built, technical standards, procedures and working practices had to be agreed jointly. As mentioned earlier, cultural and traditional differences such as the US worker being more mobile versus European companies, delayed the performance of the many non-US F-16 contractors. Some of these were eventually overcome, however this led to a delay, as well as increasing the cost, of the European F-16. Despite such problems and the inevitable political haggling over the distribution of offset work, the programme began to flow smoothly. Sub-contracts were negotiated in 1975-77 for European-produced components under the co-production agreement. The signing of "firm contracts with the four governments was delayed in early 1977, when the Danish government objected to the allocation of sub-contracts, but negotiations were finally concluded in May 1977.[98]

Due to some of the delays and problems, it was agreed that General Dynamics, as prime contractor, would assist the EPG co-producers in their initial launch by providing parts, sub-assemblies, and components, until their parts fabrication could sustain their assembly lines.[99] The initial plan was for General Dynamics to assemble the first two EPG aircraft at their headquarters in Fort Worth, Texas, disassemble them, and ship one to SABCA, and one to Fokker. These manufacturers would then reassemble them on their production lines. However, due to delays in Europe, General Dynamics agreed to manufacture almost all the parts for "at least the first 11 EPG aircraft and ship them to Europe for assembly".[100] The procedure was intended to keep the EPG programme on schedule until EPG produced parts were available. (This additional burden would be paid back to General Dynamics by the EPG manufacturers later in the programme.) The European programme called for the first European F-16 aircraft to be delivered to Belgium in January 1979. Thus, whatever the initial extra costs, the programme was to remain on schedule.

Meanwhile, General Dynamics was testing the aircraft and its performance at Fort Worth, Texas. The Air Force had awarded General Dynamics a full-scale development contract on 13 January 1975 to build 15 (later changed to 8) pre-production F-16s, the first of which was rolled out at Fort Worth in October 1976, after the design review and testing had been completed in July 1976.[101] The first flight followed in December 1976. The eight aircraft were used for various testing, for example, the third full-scale developmental aircraft was used for avionics testing.

At the end of 1976, the US Air Force, and not the SECDEF, announced plans to purchase an additional 738 aircraft bringing the total US purchase to 1,388.[102] The FY 1978 funding (conducted 1977) was to provide $1,695.5 million for the procurement of 105 F-16s - a reduction of $165.2 million on what was originally requested.[103] The House

Armed Services Committee based these reductions on the "excessive and unsupported cost growth in [the F-16] programme during the year", citing a programme cost increase of nearly $1.4 billion, and expressed "caution that the Air Force control the cost of this aircraft to ensure that it remains a capable aircraft that provides the low end capability of the 'high-low mix' concept".[104] The problems were apparently catching up with the programme, but the announcement of the full production plan was near at hand.

The F-16 DSARC III (Defense Systems Acquisition Review Council) briefing was held on 11 October 1977. (Remember DSARC had not informed Congress of the increase in cost in a "timely manner" in their SARs.) On 13 October 1977, the Deputy Secretary of Defense (and not the Secretary of Defense) announced "while recognising program accomplishments and concerns" approved "F-16 full production".[105] It was recognised that the "Air Force had a large amount of development and operational test and evaluation to be accomplished, but that on the whole the program was ready to enter full production".[106] The F-16 full-scale development test programme was constructed to prove that the advanced technology features of the prototype F-16 could be incorporated into the F-16 at low risk, and that the F-16 weapons system could meet its performance goals and minimise acquisition costs. To reduce risks to a point where a "realistic production decision could be made, DSARC II established test milestones that has to be accomplished before the DSARC III decision".[107] In the DSARC III technical assessment the Systems Programe Office "concluded that using preliminary flight test data, the F-16 will meet or exceed all the performance thresholds".[108] However, the Test and Evaluation period "was not completed until mid-1980"[109] even though in January 1979, the first full production aircraft was delivered, after the first flight of a full-production F-16 in August 1978 at Fort Worth.

Returning to Europe, by February 1978, the Belgian production line had opened followed by the Dutch line in April. The first F-16 to arrive in Europe arrived at Gosselies, Belgium, on 9 June 1978,[110] having come from General Dynamics. It was used for assembly tests at the SABCA plant. The following month, the first European built F-16 components - a set of wings - were fitted to a USAF aircraft on the Fort Worth line.[111] The two-way flow of components across the Atlantic had become a reality. Meanwhile, in April of 1978, the General Accounting Office published a report which drew attention to a number of development problems : structural cracks, minor problems with the radar, instability at high angles of attack and engine malfunctions with the Pratt and Whitney F-100.[112] One of the major reasons for the selection of the YF-16 over the YF-17 was that it had incorporated an engine that was already in production for the F-15, and thus, there would be less costs and risks than selecting the developmental GE J101 for the YF-17. However, in 1978, the "F-100 engine experience shows the following engine deficiencies which are causing operational effectiveness, safety and maintenance problems :

- Turbine blade failures and non-containment of turbine blades in engine;

- Engine stalls (in mid-air);
- Engine stagnations;
- Main fuel pump malfunctions;
- Ground starting problems;
- Augmentor malfunctions and durability problems."[113]

Indeed, these are serious problems for the F-16, especially considering that it is a single-engine aircraft. The GAO further stated, "historically, twin-engine aircraft have maintained a major engine-related safety advantage over single-engine aircraft due to the redundance offered by the second engine".[114] Even though this was a most serious problem, the GAO went on to state that, "although the F-16 program is experiencing problems, they do not seem to be any more severe than those previously experienced in other major systems. And, experience with other systems shows that these problems are resolved over time. The most critical concerns at this time include performance of the F-100 engine and the deployment and support schedule".[115]

To assist the Air Force to solve this problem "over time", a total of $39.5 million was funded under the FY 1979 procurement budget for the F-100 Component Improvement Program with an additional $38.7 million requested for FY 1980.[116] The funds received, in 1979 the Air Force initiated a joint programme with the Navy to develop a new fighter aircraft engine which could provide an alternative to the F-16's F-100 power plant, if re-engining should be necessary. However, a documentary by Granada, an independent British television group, was shown in Washington (WETA Ch.26) on 16 March 1979. The one-hour documentary outlined various problems of the co-production effort and of the F-16's design, specifically, the engine. They reported that the "rate of loss for the F-16 due to malfunction of the single Pratt and Whitney F-100 engine is currently estimated by the Air Force to be three times higher than that called for".[117] Moreover, on 1 October 1979, a crash occurred at Hill AFB, Utah, after a "sudden pitch-up" and the pilot ejected safely. The reason for the crash was the "fuel center-of-gravity problem", which led General Dynamics to reword its flight manual to inform pilots that its "flight control system does not provide the same level of protection for air-to-surface operations as it does for air-to-air combat".[118]

It would be expected that Congressional action and inquiry would be imperative, however, it was muted for two reasons, first, the Air Force already appeared to be trying to resolve the problem having initiated the F-100 Component Improvement Program. Second, it must also be emphasised that General Dynamics, with the F-16 contracts, was now the "largest Defense Contractor and also one of the best protected in Congress - the company builds its fighter planes in Texas [Fort Worth division] the home of [Senator] John Tower, who is Chairman of the Senate Armed Services Committee. The F-16 factory is in the district of House Majority Leader Jim Wright".[119] Although this would have been an additional influence in the selection of the F-16, it was of no assistance to Pratt and Whitney. (Note: General Electric is in Massachusetts, with names like Edward Kennedy and Tip O'Neil, Speaker of the House of Representatives.)

Eventually, after the GE F101 was designed and tested, it was fitted to an F-16, and the General Dynamics F-16 fighter, powered by a General Electric F101 derivative fighter engine, made its first flight at Edwards Air Force Base on 19 December 1981.[120] Presently, all F-16s are scheduled to be equipped with the new GE F101 engines that will be more reliable than the F-100s. A gain for GE, but a loss for Pratt and Whitney. However, Pratt and Whitney are presently designing and testing an engine replacement for the F/A-18 - a complete swapping of contractors in mid-stream. What had once been a reason for the choice of the F-16 became a nightmare - the F-16 programme was vulnerable - after somewhat heightened political activity, the problem of the engine was resolved by selecting another engine and, the dust having settled, the programme continues. In fact, in February 1982, the Air Force announced another buy of 945 F-16s - the new schedule, described by the "Air Force as 'fluid', calls for the Air Force to purchase a total of 2,333 F-16s through fiscal 1991. Previously, 1,388 F-16s had been planned through 1987".[121]

Relating all of this discussion to the point made earlier of a two-tiered system of decisional centres, it is evident that shifts downwards or upwards do occur. Consider that after governments had signed the MOU, and a Steering Committee was formed, much of the responsibilities were upon the prime contractor and the Air Force Components to implement the contracts. The European side would differ slightly though, in the respect that the majority of the contractors (SABCA, Fabrique Nationale) are nationalised industries which might be subject to closer control than their US counterparts. Also it was the Air Force, and not the Secretary of Defense, who arranged for and announced that the F-16 European Systems Program Office in Brussels was operational. Regarding some of the delays encountered on the European side, although the Congress was made aware of them and the increase of costs, from the GAO, it was not Congress or the Secretary of Defense who made proper arrangements to resolve the problem. It was the contractor working with the Air Force to maintain its schedule programme who entered into agreements with the European contractors to provide parts or aircraft until their assembly lines were complete.

It was also the Air Force who announced an increase of orders of 738 aircraft, and again later in 1982 an increase of an extra 945. Although the Secretary of Defense did not make these announcements, he would have been briefed all throughout the process to be fully aware of all the arguments to increase the numbers, because it would be he who would steer that request for funding under the scrutiny of Congress. It is a wise strategy on the part of the SECDEF, to allow a given Service to make such announcements, so as to appear that the experts are the best judges as to its needs. In other words, such announcements are best to be as apolitical as possible. If this was the case, perhaps this strategy was applied to the engine problems, which could have had disastrous effects on the programme had nothing evidently been done by the Air Force at the time of Congressional inquiry. Consider the following, the Air Force announced the F-100

Component Improvement Program, after the GAO report in the Spring of 1978, and having received funding for 1979 began to resolve the problem. (No inference is being made that the Air Force was not aware of the problem before the GAO report - the inference is the Air Force would have to work hard and fast to lessen Congressional criticism.) Following the crash, political pressures rose, but the Air Force was already in the process of solving the problem and the political activities that could have weighed heavily were muted by doing so, as well as having friends in the right places of Congress.

However, it is not to be envisioned that it is a system where, for example, the Air Force is continually trying to depoliticise every aspect of the programme - it is, in the sense that it will strive to stave off criticisms which might jeopardise or set back or even cancel a programme. (In the case of the engine, major problems could have arisen for the programme, simply because aircraft are dependent upon their engines, more so with a single engine aircraft.) But any Service also realises that there are huge benefits from the political system as well - the obvious one being funding. There are other political dimensions at this stage in the programme which can enhance the programme itself - foreign sales to third countries. Such sales are arranged on a government to government basis and are conducted by the respective political actors/managers responsible because such negotiations fall within a political arena, under the auspices of Congressional scrutiny. Thus, it is within the domain of the accumulated political skills of, the President, the NSC, the Secretaries of Defense and State, and the JCS, to conduct such negotiations and have them approved by Congress. A discussion of the foreign sales will illustrate the ups and downs of the political activity found during the production and deployment phases (aside from yearly cyclical funding required from Congress).

Foreign Sales to Third Countries

Whilst the co-production effort was advancing somewhat on schedule, the first European assembled F-16 flew from Gosselies, Belgium, on 11 December 1978.[122] However, a year and a half before that, another aspect in the programme was being considered. In August of 1976, the Department of Defense agreed to sell Iran 160 F-16s for $3.8 billion, beginning deliveries in 1980.[123]

However, before discussing the foreign sales of the F-16, some general points and issues relating to foreign sales must be made. "The United States uses foreign military sales to provide military assistance to foreign countries".[124] The principal objective of foreign military sales, established by the Arms Export Control Act of 30 June 1976, is to : "... facilitate the common defense by entering into international arrangements with friendly countries which further the objective of applying agreed resources of each country to programs and projects of co-operative exchange of data, research, development, production, procurement and logistical support to achieve specific national defense requirements and objectives of mutual concern".[125]

To this end, the Act authorises the US to sell defence articles and services to countries that are able to pay to equip their military forces without undue burden to their economies, when it will "further the security objectives of the US and it will be consistent with the objectives of the United Nations".[126]

Numerous departments and agencies within the Executive Branch such as the NSC, Agency for International Development, Departments of State, Defense, Commerce and Treasury, have various responsibilities for foreign military sales. However, aside from the President, "who has final determination", the principal responsibilities established by legislation have been assigned to the Secretaries of State and Defense.[127] The President has delegated foreign military sales to the Secretary of State. He, in turn, has delegated it to the Under Secretary for Security Assistance. The action has been assigned to the Bureau of Politico-Military Affairs and its operating bodies.

1. Office of Security Assistance and Sales, which assesses political economic and legal factors associated with foreign sales.

2. Office of Munitions Control, which regulates commercial exports of arms, and related technical data.

The Under Secretary for Security Assistance also chairs the Security Assistance Program Review Committee, which resolves the major policy issues and formulates security assistance programmes by country. The Committee includes representatives from DoD; Office of Management and Budget; National Security Council; and Departments of the Treasury, Commerce and Labor.[128]

Although overall responsibility for foreign military sales is vested with the Secretary of State, the offices of the Assistant Secretary of Defense (International Security Affairs ISA); the Deputy Assistant Secretary (Security Assistance); and the Defense Security Assistance Agency are the major action offices within the Office of the Secretary of Defense. These are the major actors in the DoD concerned with foreign sales, and as in weapons procurement, authority has been delegated downwards to other departments in the DoD as well as the Department of State. Within the DoD, the step by step management of foreign military sales is co-ordinated through the procurement and logistic offices at the Office of the Secretary of Defense level and their counterparts in the individual service headquarters and their subordinate commands. The purpose of these last few pages is not to describe the overall process of foreign sales. It is to demonstrate that, in general, in weapons procurement even a specific function like foreign sales, requires the same compartmentalisation and specialisation. Further, it demonstrates the complexity of decisions and the delegation of authority downwards, and as in the case of a foreign sale within the State Department, the decisional centres perhaps also shift within that Department.

Foreign military sales have grown from $952.6 million in 1970[129] to $21.07 billion in 1982.[130] Although according to the US Arms Control and Disarmament Agency, the US controls almost one-half of the world arms market, there is competition between major industrial powers, which creates somewhat of a buyer's market. For example, if one nation will not sell, there are others waiting in the wings with comparable arms who will. One market advantage for the US is the "high technology embodied in its arms and the demonstrated capability to provide support. However, other nations, such as the Soviet Union, West Germany, France and the United Kingdom, are striving to close these technological and support gaps".[131]

Although there are economic and technological considerations in arms sales transfers, "the ultimate decision on any arms transfer proposal is necessarily political in nature. Those who make the final judgments must ask themselves ... [if the sales] will produce a commensurate advance in American national well-being".[132] As Henry Kissinger pointed out, "those in authority must also weigh the effects of denial ... moreover, arms transfers - like the other exercises in international relations - cannot be viewed in isolation".[133] The decision to order a particular weapon system is "a complex choice involving the interaction of economic and political considerations as well as purely national security interests".[134]

Regarding the political nature of foreign arms sales, at the time decisions were being made to choose the YF-16 over the YF-17, Congress was increasing its role through legislation. Before 1975, Congressional approval was required for the annual military aid proposals, however, until 1975, not only did Congress <u>not</u> vote on the Foreign Military Sales Program, but it was <u>not</u> even officially notified of such transactions. During the 1950s and 1960s, Congress usually approved military aid programmes which the Executive Branch recommended. In the late 1960s and early 1970s, "largely in response to the Executive Branch's conduct in the Indochina War, many Members of Congress began to take a more active interest in the foreign policy implications of US arms transfers".[135] In 1975, Congress took the first steps to gain some control. It passed legislation requiring the Department of Defense to inform Congress of all foreign military sales transactions over $25 million. Congress could then veto these sales if both Houses voted to do so within 30 calendar days. Congress further expanded its control in 1976. It proposed and voted in legislation that would have placed a $9 billion ceiling on all US arms sales abroad, commercial and government-to-government combined. President Ford vetoed this legislation and Congress reached a compromise by extending its veto power over each proposed foreign sale of $7 million for major weapon systems.[136]

As opposed to the government agreements for co-production, foreign sales are not solely conducted by government-to-government. "When a foreign government spends its funds [on a weapon system], it is arguable that it should be allowed to choose its contractors by any method it chooses".[137] US corporations actively promote sales of American weapon systems and services abroad through their use of sales agents, commissions and tours of their weapon systems through foreign countries. "US co-production, licensing and offset agreements and sales add a complicated dimension to American arms transfers, practice and policy".[138] Although contracts vary from one to the other, agreements usually permit the manufacture of US arms in foreign countries. In other words, they permit the export of military technology along with the weapon system itself, or, there may be an agreement for a direct sale of a US system to a foreign buyer.

The Iranian order was the first major sales arrangement for the F-16.[139] The order can be traced back as far as 1972, when "President Richard M Nixon and Henry Kissinger promised Shah Mohammed Reza Pahlavi, during a May 1972 visit to Tehran, that he could buy virtually anything".[140] This created confusion later for the Iranians, for they had thought they had received blanket authorisation for future purchases. This issue surfaced on 10 September 1976, when Lt. General Howard Fisk told the Senate Sub-Committee on Multinational Corporations, that Iran had been told that its interests in acquiring a total of 300 of the F-16s was under study.[141] According to the Sub-Committee Staff, a letter from General Dynamics, dated 13 August 1976, was delivered to General Hassan Toufanian, Chief of the Iranian military procurement, which quoted a price of $2.1 billion for 300 of the planes and some spare parts.[142] This caused some irritation and confusion to the Iranians because the price quoted by the US Government for 160 aircraft was $3.8 billion - nearly half the number for twice the price. Needless to say, General Dynamics had no comment, but Lt. Gen. Fisk pointed out that the "General Dynamics figure did not take into account anticipated inflation over the years of any such contract, nor did it include the years worth of spare parts and training".[143] Some US officials as well as Iranians felt that the company had deliberately tried to bid low on the order, hoping to raise the price later.[144]

Meanwhile, the Senate Foreign Relations Sub-Committee on Foreign Assistance, another sub-committee reviewing the Ford administration's plan to approve the sale of 160 F-16s to Iran, was expressing concern that 1,000 additional American civilians would be assigned to Iran in the 1980s, for long term support of the F-16s. Under Secretary of State, Philip Habib, told the Sub-Committee, "We agree with the Shah's recent comment that if Iran should become involved in hostilities, the Americans in Iran would be completely free not to become involved".[145] Habib urged the Sub-Committee (headed by Hubert Humphrey) to approve the F-16 sale to Iran on grounds of US national interest. Habib called Iran, "a major ally both able and willing to stand on its own two feet, pay its own way and use its influence in a highly responsible manner".[146] Also testifying was Deputy Secretary of Defense Robert Ellsworth who said that the sale of 160 F-16s would serve as a "center of strength and stability in the area; withstanding Soviet designs in the region which are carried out directly or through surrogates; and joining with Saudi Arabia in providing a strong defense for the Persian Gulf area".[147] And, further, Robert Ellsworth told the Sub-Committee that "the sale should have a favourable impact on the USAF program since the purchase of these F-16 aircraft by the Government of Iran should reduce our unit cost per aircraft ...".[148] Also in September, Iran announced its interest in buying 250 land based F-18s, (to complement its order of 300 F-16s - the US Government was still only considering 160 F-16s), which were still being developed by Northrop. However, in June 1977, the Carter Administration disapproved Iran's pending F-18 request, on the grounds that arms sales policy prohibits the foreign sale of advance weapons "until they are operationally deployed with US forces".[149]

The August 1976 approval by the DoD to sell Iran 160 F-16s made its way through Congress without change to the programme. The only change in the programme came in February 1977, when the Air Force decided to push back the delivery date of the first F-16 from March 1979 to January 1980, partly because some of the European delays, and also US Air Force planners argued that the accelerated delivery would introduce very high risks to the programme and could adversely affect the co-production programme involving the United States and the four participating European Governments.[150] Also, after the turndown of the F-18 order, Iran increased its order to a total of 460 F-16s.

However, in May 1977, another political dimension entered the controversy of the sale of F-16s to Iran - one which the Administration may have brought on itself. Growing out of a series of campaign promises, President Carter outlined a policy on 19 May 1977 to curb the sales of weapons abroad. Mr Carter announced that overseas arms sales would henceforth "be considered as an exceptional tool of foreign policy subject to very specific controls and justified only by national security needs".[151] By September 1977, Carter's credibility was being challenged over the proposed sale - critics in both the House and the Senate compiled statistics showing that the Administration had already approved 45 foreign arms and services transactions totalling more than $4.1 billion in the four months following the May proclamation.[152]

Prior to President Carter's policy, the Israelis submitted a formal request to buy 250 F-16s and the order. A State Department spokesman, Robert Funseth, confirmed that the US had received the request, and the Ford administration was seriously considering it "specifically concerning how many planes would be provided and when".[153] On 22 February 1979, the Department of Defense notified the Congress that "75 F-16s would be sold to Israel for $1.5 billion in estimated value if the Administration's plan to sell F-5s to Egypt and F-15s to Saudi Arabia and Israel is not blocked by Congress".[154] An effort to defeat the plan was rejected in the Senate by a vote of 54 to 44 on 15 May 1978.[155]

Momentarily backtracking to Iran, the first 55 F-16s of the 160 were on firm order, and being produced when the Shah of Iran was toppled and replaced by the transitional Bakhtiar Government. In February 1979, the Bakhtiar Government cancelled an order of $7 billion worth of US military equipment. Included in the list was the entire lot of 160 F-16s.[156] Immediately, the Administration had to alleviate any burden to General Dynamics and other contractors, and requested in a supplemental defense budget for FY 1979 nearly $2.2 billion to absorb (for the Pentagon's use) the Iranian orders - $765 million of that for the F-16s.[157] The US takeover of the 55 F-16s, not yet built, would allow Israel to take early delivery of its 75 F-16s out of the production run that had been allocated to Iran. Moreover, the Department of Defense estimated that the cancellation of the Iranian order might increase the cost of the US Air Force's F-16 programme by about $245 million, and that of NATO's programme by $45 million.[158] On 22 February 1979, Defense Secretary Harold Brown notified Congress that 75 F-16s would be sold to Israel for $1.5 billion as part of the package deal mentioned above. Israel's first F-16s were to be delivered in late 1981, but in connection with the Egyptian-Israeli peace settlement of 26 March 1979, the delivery date was advanced to early 1980, when the first planes originally built for Iran were available. The first Israeli F-16 was delivered on 31 January 1980, and over 50 of the 75 were already delivered by the date the Israelis should have received their first.[159] They also had this inventory of 50 F-16s when eight were used in an attack on Iraq's nuclear reactor near Baghdad on 7 June 1981. The F-16 had performed well, and the Israelis (and the USAF), pleased with its evaluation, requested another purchase. On 27 May 1982, the White House announced the sale of another 75 F-16s to Israel to begin delivery in 1985 which encountered little opposition from Congress. The submission to Congress had been timed to appease Israel (Reagan would be meeting Prime Minister Menachem Begin in June) in the hope that notice of the new sale would tone down the Israeli anger at the US for considering the sale of F-16s to Jordan.[160] Ironically, Reagan would be meeting Begin in New York at a special United Nations session on disarmament.[161]

Earlier in 1982, the Administration was also considering selling 18 to 24 F-16s to Jordan. Proponents of the F-16 sale claimed it was the only fighter which could perform against the Soviet MiG-23s flown by Syria. However, opponents pointed out Israel's fears that such weapons could challenge Israeli dominance of Middle East airspace.[162] In the end, a Concurrent Resolution was passed disapproving the sale of the F-16 aircraft and mobile missile launchers to Jordan. The Resolution stated : "Resolved by the Senate (the House of Representatives concurring), that the Congress objects to the sale to the Kingdom of Jordan any of the following defense articles, together with any associated spare parts and equipment and related services :

(1) F-16 aircraft; and
(2) mobile anti-aircraft missile launchers."[163]

In March 1982, the Department of Defense notified Congress of the sale of F-16s to Egypt. Two years earlier, on 22 February 1980, Egypt, partly as a gesture of the Camp David peace accord between Israel and Egypt, and because of a "sharp turn in US policy in reaction to events in Iran [holding of hostages - day 112][164] and Afghanistan"[165], was the beneficiary of a $1 billion request by the Carter administration in military credits. This cleared the way for Egypt to acquire the F-16. The March 1982 announcement by the Department of Defense, notified Congress of its intent to sell Egypt 40 F-16s. Lt. General James Ahmann, Director of the Defense Security Assistance Agency, (they were not involved in getting Europe to select the US ACF), said that, "Egypt will receive its first F-16s this month and the remaining 34 by mid-1984".[166] The agency handles US arms sales to other nations. Notice should be taken that six aircraft would be delivered within days of the announcement - the F-16 was at full production - "sources indicate that General Dynamics' Fort Worth production line [in itself] is capable of handling a rate of up to 45 aircraft per month".[167]

Other nations which considered and ordered the F-16 in 1981 were South Korea (36), Pakistan (40) and Venezuela (24).[168] The Administration sought for, and received, approval from Congress to advance the sales, and either the aircraft have been delivered or are in the process of being delivered at this time (Korea started to receive in February 1986). And, there were other nations who considered the F-16 for purchase but ultimately, the F-16 lost out to the Navy's F/A-18. The Canadian government decided on 10 April 1980 to buy 137 of the latter twin-engine fighter/attack aircraft, after a five year competition.[169] The Royal Australian Air Force also selected the F/A-18 over the F-16 in October 1981 for a buy of 75 aircraft; and in July 1982, the Spanish Government agreed to purchase 84 F/A-18s.[170]

SUMMARY

The decisional centres appear to shift upwards during foreign sales, but why this happens is more important than a description as to whom was involved. Assuming that arms transfers serve national political aims, whether US or foreign, permits the argument to be suggested that, inherently arms transfers are political and "they must be subject to political control, ie ultimate sanction by policy makers, whose final decisions are responsive to sound policy arguments".[171] Thus, those at the top are responsible because the "ultimate sanction by policy makers" is required. The suggestion here is for three reasons :

- They are conducted for the most part on a government-to-government basis; and, if not, on a foreign government to contractor basis.

- The initiating of a foreign sale begins at the top.

- Because of the organisational process where Congress has legislated itself into the organisation to review such requests, the political activity is heightened and the managers/politicians of DoD are called upon to exercise their skills.

Perhaps the greatest difference to weapons procurement in general is that foreign sales, for the most part, are conducted between the US government and a foreign government. The reasons why foreign nations (and international organisations) prefer to deal with the US government instead of directly with commercial sources are :

- Foreign procurements receive the increased protection of the US procurement regulations.

- Foreign nations are assured that the items supplied will meet standard US government configurations.

- Many foreign nations are inexperienced in procurement procedures but have had long-standing diplomatic experience.

Thus, the greatest difference (to weapons procurement) specifically is the origin of a sale. Whatever the decisional organisations of a foreign country, it can be safely assumed that, for the most part, someone in top management of that country (Shah of Iran, Hussein of Jordan) requests a buy, if not directly through the contractors, then through an equally high component in the US government.

NOTES

1. ABRAHAMSON, J (Brig.Gen. USAF), "F-16 - NATO's Military and Economic Cornerstone", Defense Systems Management Review, Vol.1, No.3, p.19.

2. NATO Facts and Figures, Brussels, 1976, p.27.

3. "NATO Standardisation : Political, Economic and Military Issues for Congress", Report to the Committee on International Relations, House of Representatives, 29 March 1977, p.8.

4. Idem.

5. Idem.

6. The author is not suggesting that NATO had not been concerned with RSI beforehand. For example, immediately after the Alliance's creation, an integrated defence force was envisioned. Endorsed by the NATO foreign ministers in 1950, this led to the Mutual Defense Assistance Program. See, BEER, F, "Integration and Disintegration in NATO", Ohio State University Press, 1969, for a more detailed description of NATO standardisation from 1949 to the late 1960s.

7. "Management of Multinational Programs", Joint Logistics Commanders Guide for Defense Systems Management College, Fort Belvoir, Virginia, July 1982, p.2-1.

8. "NATO Standardisation : Political, Economic and Military Issues for Congress", Report to the Committee on International Relations, House of Representatives, 29 March 1977, p.14.

9. Idem.

10. "Withdrawal from Vietnam : New Priorities for Congress", Washington Post, 28 May 1975, p.A3.

11. Public Law 93-365, Sec.302(c).

12. US Congress, House Committee on Conference, Department of Defense Appropriations Authorization for Fiscal Year 1976, 94th Cong., 1st Sess., Washington DC, 1975, p.71.

13. Bill, House of Representatives - H.R. 6674, 94th Cong., 1st Sess., 1975.

14. US Congress, House Committee on Conference, Department of Defense Appropriations Authorization for Fiscal Year 1976, 94th Cong., 1st Sess., Washington DC, 1975, p.71.

15. US Congress, House Committee on Conference, Department of Defense Appropriations Authorization for Fiscal Year 1977, 94th Cong., 2nd Sess., Washington DC, 1976, p.53.

16. Ibid, p.58.

17. Ibid, p.59.

18. CALLAGHAN, T, "The Unbuilt Street - Defense Industrial Co-operation Within the Alliance", NATO's Fifteen Nations, Vol.27, October-November 1982, p.44.

19. Idem.

20. See, Defense Authorization Act of 1983, which printed text of amendments; 1979 Report by the House Armed Services Sub-Committee on NATO Standardisation, Interoperability and Readiness.

21. Eurogroup is composed of an informal grouping of European members within the framework of NATO for the purpose of closer European co-operation within the Alliance.

22. KOMER, R, "Ten Suggestions for Rationalising NATO", Survival, Vol.19, April 1977, p.71.

23. The Independent European Programme Group was established in February 1976, as a result of a decision taken by Eurogroup Ministers to establish a new forum, in which France could participate, for European co-operation in defence procurement. Although it had no formal structure, in practice it meets at several levels :

    - "Under Secretary of State" meeting annually
    - "National Armaments Director" meeting biannually
    - Expert Panels

    "The IEPG is committed to promoting European co-operation and standardisation in weapons development and procurement." See, "Management of Multinational Programs", op.cit., p.408.

24. CAREY, R, "Problems of Standardisation in NATO Arms Procurement", Paper delivered at University of St Andrews, 23 May 1984, p.13.

25. The "Buy America Act" of 1933 requires all items for public use to be manufactured in the USA, which has had the effect of dependence on the US industrial sources for procuring arms.

26. "No Easy Choice : NATO Collaboration and the US Arms Export Control Issue", GAO Report - An Unclassified Digest of a US Classified Report C-ID-80-4, 26 August 1980, p.i.

27. Ibid, p.i.

28. Idem.

29. LABERGE, W, "Standardisation and Interoperability : Another Perspective", NATO Review, Vol.24, December 1976, p.22.

30. McGARRAH, "An Assessment of a Policy for US-Allied Military-Industrial Co-operation", Defense Management Journal, Vol.14, September 1978, p.38.

31. Idem.

32. The competition referred to is not solely caused by jealousies or economic selfishness - a fundamental source of the lack of RSI and catalyst for competition is in the concept of sovereignty itself. For example, NATO forces were meant to be a "collective force", not a "collection of national forces". EDMONDS, M, "International Arms Procurement", Pergammon Press, 1981, p.56, quoting from the Greenwood Report - "Report on a Policy Promoting Defence and Technological Co-operation Among Western European Countries, 1980.

33. "Dealing for the F-16", Washington Post, 2 March 1975, p.A3.

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    1975 - 9.1%
    1976 - 5.8%
    1977 - 6.5%
    1978 - 7.7%
    1979 - 11.3%
    1980 - 13.5%
    1981 - 10.4%

    Source: "Statistical Abstract of the United States 1984", US Department of Commerce, 1984, p.495.

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> "The availability of jobs in industry can have a subtle but debilitating effect on an officer's performance during his tour of duty in a program management assignment. If he takes too strong a hand in controlling contractor activity, he might be damaging his opportunity for a second career following retirement. Positions are offered to officers who have demonstrated their appreciation for industry's particular problems and commitments."

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155. *Idem*.

156. "*General Dynamics F-16 A/B Fighting Falcon*", DMS Market Intelligence Report, DMS Inc., 1980, p.8.

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CONCLUSION

From the foregoing discussion, it should be apparent that no single conceptual approach or model suffices in the study of decision-making found within the environment of US armaments procurement. As witnessed, there are too many different variables and influences operative from within the organisational decisional centres as well as upon them. Moreover, the importance of these respective decisional centres are in a state of flux, which permit decisions to be the resultant of an individual or group advocating the decision not based or dependent upon his/their position of authority. Also these decisions can be affected by variations in organisational, bureaucratic, or personal factors,and by structural influences,(legal or extra-legal) and by manufacturers' associations, program managers in DoD, and so forth, all of which are interacting at different stages of the development of a weapon system.

Moreover, the entire process becomes more complex when accounting for the shifting between various decisional centres. The determination of the influence of decisions from those in authority is further complicated following the review of organisational/ structural roles. Those at the top tend to be managers, chosen for their managerial and political skills. Obviously, given the size of the organisations within the defence establishment, it is virtually impossible for those in authority to be cognisant of, and be able to comprehend, every weapon system at each and every stage. It is not the purpose of this exercise to prove that point. The focus is that the decisional centres within the defence establishment shift and the actual shifting which occurs can act as an influencing factor it itself. This is further exacerbated by the structure of the organisational processes which promote this notion, for example, Fiscal Cycle Overlap, Five Year Defense Plans, the diversification of Congressional Committees (all having some form of jurisdiction), Selected Acquisition Reports, DoD Components, assistance to the Joint Chiefs of Staff, and so forth. Given this, it is seriously misleading to apply <u>one</u> conceptual model to the <u>whole</u> of the decision making process.

Throughout the life of a weapons system the constant which exists within this overlapping of jurisdictions is found within the levels of the DoD Components. But, what becomes apparent is that those at the top possess a great deal of influence when their managerial and political skills are called upon at various stages of the weapon systems development. For example, consider the roles of Congress and the Secretaries of Defense and State during the sales of the F-16 to foreign countries. However, it should not be perceived that once a specific role (e.g. foreign sale) is completed, that their influence diminishes quickly regarding a specific weapon system. They may be actively involved in other decisions regarding other systems which complement that system in the force structure. Decisions on other systems may have a negative or positive impact on decisions already made or soon to be made on another given system. Consider the outcomes of the sale of the F-16s to Israel, Egypt, Jordan (negative) and Iran (at first positive, later negative).

Although there are a countless number of scenarios to be pursued in the development of a given system, the point is that the decision making involved is a continuous phenomenon over the vagaries of time. Moreover, those at the top may also exert some influence during the earlier stages of the development of a weapon system. For example, Secretary of Defense Robert McNamara and his policy of cost effectiveness, which set the parameters which perhaps influenced his decision to push for the commonality of aircraft, both for the Navy and the Air Force. Congress also exerted pressures by informing the Navy that funds would be frozen until they had chosen a derivative of the Air Force's choice of a Light Weight Fighter (LTV working with General Dynamics on Navy version of F-16). However, today, the outcome of these influences are arguably negative in that there is still no common aircraft in the inventories of the Air Force and the Navy. Why?

The conjecture herein is that the DoD Components, although they are loosely defined in themselves, are the constant found in the development of a weapon system. Due to the organisational structure and the decentralisation of decision making within the defence establishment, it was the DoD Components exerting pressures from below, which placed constraints on the latitudes available to those at the top. Regarding the commonality issue, this was most pronounced by the interservice rivalry between the Air Force and the Navy, in which the Navy managed to convince the Congress that the Navy should choose its own aircraft - the F/A-18. Also, as demonstrated in the discussion of the Fiscal and Life Cycles, it was these DoD Components, who whilst enjoying a close working relationship with contractors were consistently preparing, outlining, and arranging the necessary documentation and evidence required by the decisional processes. Especially pronounced in the earlier stages of weapons development, this substantiated the point that decisions tend to radiate upwards which permitted the DoD Components to exert a greater input in the decision than those in authority. For example, the research of new avionics and engineering testing was conducted at the lower levels and influenced greatly by the "Fighter Mafia".

The behaviour of the DoD Components exhibited traits of Graham Allison's organisational and bureaucratic politics models. For example, within the organisation of the Navy, and given its esprit de corps, how it reacted, and the outcomes produced, could have been an organisational output. Also, the interservice rivalry between the Air Force and the Navy, on this issue, or the rivalry and arguments between the Navy and the Congress could be indicative of the bureaucratic politics model. Allison's Model II based on Governmental action as organisational output from standard operating procedures,clashed with his other Model III, known as Government or Bureaucratic Politics Model based on government action as a political resultant. The suggestion herein, however, is an approach that government action as a political resultant may also act as an input to government action as organisational output. In other words, aside from Model II influencing Model III, the opposite applies and this substantiates the view that Allison himself subsequently developed. Consider the discussion of the Air Force shortening the trials of the YF-16 to fit within the timetable of events concerning the European choice for a new fighter aircraft.

Moreover, considerations of rationality at times influenced both Models II and III. For example, decision making can be very rational (without organisational pressures) considering the influences exerted by Col. John Boyd or Pierre Sprey (who worked in the Office of the Assistant Secretary of Defense, Systems Analysis (OASD/SA)) in their theories regarding aircraft design and their choices of engine, radar and avionics. Or the choices could be argued to have been an organisational output in the case that the OASD/SA prepared the Systems Concept Paper which became part of the Defense Guidance (DG). The DG is a basic element of the Planning, Programming and Budgeting System (PPBS) which in itself follows the standard operating procedures seen within the Fiscal Cycle. Or, it could have been the bureaucratic pressures exerted on that organisation (OASD/SA) by another organisation (Congress) who asked for his support for the protection and maintenance of that organisation's decisions. Endless arguments could be provided to support any of the above, and in a sense an attempt to differentiate between them is subjective. All three paradigms are useful as long as a specific decision is viewed along all three lines and the paradigms are viewed as complementary rather than alternatives.

However, what is limiting in the application of these models, and other models (Incrementalism, sequential decisions, Groupthink, etc.) is that they are not comprehensive enough to encompass the shifting that occurs within the decisional centres. The decision making of weapons procurement is an ongoing phenomenon whereby decisions should not be judged in isolation by perceptual frameworks. For instance, new technologies are constantly emerging which may change or redefine the requirements of a given service (for example, Cheyenne Helicopter), even at the stage of deployment. And, following Operational Suitability Testing, a system's requirements are continually amended to fit into the overall force structure.

Decision making for the acquisition of weapons in this regard may exhibit some of the traits of Charles Lindblom's model of Incrementalism. Decision making as a never ending sequence of compromises has its place in policymaking, but the inference is that drastic changes are avoided, or that the importance of rational decisions is diminished due to the pressures exerted by the organisation. This has been shown otherwise when considering the demands of new avionics and the technological advances to support such avionics in the decisions to procure the F-16. Perhaps the relevance of the incremental model to the decisions of weapons procurement lies in the nature of its environment, namely that the decisions follow a sequential pattern in the Planning, Programming, and Budgetary System.

For US military products there are the demands for technologically advanced systems which may require or result in large programmes. In addition, Charles Lindblom's theory of Incrementalism advocates the notion of "muddling through" whereby decision making should be viewed as a slow evolution of policies by cautious incremental changes. Thus, this perspective would incorporate trappings of satisficing which have been demonstrated not to be the case by examples of the "Fighter Mafia" pushing for new technologies in avionics, and not willing to compromise in their opinions for the designs of the F-X programme. Returning to Graham Allison for a moment, this example substantiates the idea that Pierre Sprey could have used the influence of his office (OASD/SA) to make sure compromises (in avionics for YF-16) would be kept to a minimum.

The decisions of weapons procurement could strictly be defined as incremental over a period of time but the use of this perceptual framework in the sense of muddling through distorts many relationships exhibited throughout the thesis. For example, the relationships of the DoD with the contractors would have to be seen as each trying to strive for consensus with one another during the stages of the development of a system. For the most part defence contractors enjoy a close working relationship with DoD Components to research new technologies and match these with a Service's requirements. Also the DoD Components maintain this partnership with the contractors throughout the entire life of a system, as demonstrated by the repeated testing and evaluation performed on the systems. However, consensus failed to play a role when Ling Temco Vought lodged an inquiry within the General Accounting Office. This was to pressure the Navy, who it had been working with to accept its (LTV) designs of the General Dynamics derivative of the F-16 to meet the Congressional demands for commonality.

This not only demonstrated the upheavals and drastic changes within the progression of events, but also showed the relative weakness of Congress. Despite the various roles which Congress apparently plays throughout the defence planning process, its principal weakness is that it does not participate directly in that process. As a resource allocator and critic of defence procurement,and with a multiplicity of decisional centres within it (Committee system, Ad Hoc groups, etc.), Congress perhaps best approximates the notion of incremental decision making. However, the outside organisations or consumers have various means to obtain what they want. An interesting mechanism by which to accomplish this is to subcontract for components in as many states as possible, as was seen in the cases of the F-16 and F/A-18. Although more structured, another example is the budgetary process itself, whereby DoD Components are able to constantly trade off within the environment of three consecutive budgetary processes, all of which are operative simultaneously.

Further, as consumers, the DoD Components, who define the requirements inherently possess the expertise which has a function in Congressional deliberations. Congressional technical competence is reflected in that many congressmen may feel that they are expert on most domestic issues (for public consumption).

However, regarding defence issues, they depend on the "experts" in uniform. This not only means that the SECDEF or the Joint Chiefs of Staff appear before Congress, but also that the DoD Components testify continuously. Beyond them, other related interest groups and contractors spend billions of dollars each year to expound on their expertise on defence related issues. It can, therefore, be seen how conflicts in Congress are resolved more often than not by political pressure, not by a rational presentation of the issues. Regarding the commonality issue and considering the pressures imposed by the Navy, Air Force, individuals, other DoD Components, SECDEF, JCS, contractors and so forth, it is arguable that consensus in Congress was attained from influences from below and those at the top.

Furthermore, although the thesis highlighted a majority of the organisational and decisional centres, there are an endless number of subgroups within the defence establishment, Executive Agencies regulations, Public Laws, Manufacturing Associations lobbying for contractors and so forth, all of whom exert influence at various stages and throughout the development of a weapon system. The same applies for the case study of the F-16 where other subgroups, etc. were also active. The exhaustive and detailed account of all such elements would have resulted in either an extensive government manual or a historical account of the F-16. Thus the reality of decision making is even more complex than written herein. However, what emerges is that theorists of decision making should move away from simple conceptual approaches.

Early on the thesis criticized Graham Allison because his leaders are never clearly defined as to whether they are politicians, political appointees or civil servants. Herein,this thesis may be subject to the same criticism in that DoD Components are never clearly defined. DoD Components were referred to as professional bureaucrats, civilian as well as military, working at the DoD/Pentagon. The label of DoD Components does not include the political appointees to the DoD, for example, the SECDEF, Deputy Secretary of Defense, and so forth (see, footnote 63 of Chapter 2). The criticism may be that it is a case of political appointees versus the professional bureaucrats or Services. However, it is not that clear cut since the arguments provided in this thesis are still solvent when momentarily treating one chosen for his managerial and political skills as a DoD Component. Take for example, Deputy Secretary of Defense David Packard, a political appointee who also was a strong advocate of the Light Weight Fighter Programme. As witnessed he was instrumental in lobbying Congress, et al, for the support of that programme - a managerial role. But it is arguable that he would exhibit the role of a DoD Component in his relationship with the SECDEF as Chairman of the Defense Resources Board. However, other DoD Components below him would have been instrumental in shaping and perpetuating his advocacy of the programme. An example was the Office of the Director, Defense Research and Engineering (DDR & E) (Dr. John Foster) which was the Acquisition Executive for the Defense Systems Acquisition Review Council (DSARC) and whose office (DDR & E) also prepared the Decision Coordinating Paper which ultimately became the basis for the PPBS. Also the Decision Coordinating Paper is the contract between the SECDEF and a given Service.

Or another office which influenced David Packard was the Office of the Assistant Secretary of Defense, Systems Analyses (Pierre Sprey) which produced the Systems Concept Paper.

Although the line of demarcation between DoD Components and managers is artificial, decision making in the US defence establishment tends to radiate upwards. Weapons procurement is inherently a heterogeneous activity which may, in itself be a causal factor for decisions to be made in this fashion. As witnessed, that activity varies considerably over many dimensions, some not even mentioned herein (for example, the top secret "Black Budget" which Congress approves each year without knowing what it is even approving - in FY 1988, $24 billion)[1]. Nevertheless, it is the hope that the theme of this thesis expresses the reality of the decision making process in weapons procurement unhindered by the handicap of applying simplistic conceptual models.

1 "Cost of Stealth Bombers Soars to $450 million Each", Washington Post, 21 May, 1988, pp.A-1.

March 19, 1980
NUMBER 5000.1

USDRE

Department of Defense Directive

SUBJECT: Major System Acquisitions

References:
(a) DoD Directive 5000.1, "Major System Acquisitions," January 18, 1977 (hereby canceled)
(b) DoD Directive 5000.2, "Major System Acquisition Process," January 18, 1977 (hereby canceled)
(c) DoD Directive 5000.30, "Defense Acquisition Executive," August 20, 1976 (hereby canceled)
(d) through (g), see enclosure 1

A. REISSUANCE AND PURPOSE

This Directive reissues reference (a), cancels references (b) and (c), and updates the statement of acquisition policy for major systems within the Department of Defense. This Directive also implements the concepts and provisions of Office of Management and Budget (OMB) Circular A-109 (enclosure 2).

B. APPLICABILITY

The provisions of this Directive apply to the Office of the Secretary of Defense (OSD), the Military Departments, the Organization of the Joint Chiefs of Staff (OJCS), and the Defense Agencies. As used in this Directive, the term "DoD Components" refers to the Military Departments and the Defense Agencies.

C. OBJECTIVES

Each DoD official who has direct or indirect responsibility for the acquisition process shall be guided by the objectives of OMB Circular A-109 (enclosure 2) and shall make every effort to:

1. Ensure that an effective and efficient acquisition strategy is developed and tailored for each system acquisition program.

2. Minimize the time from need identification to introduction of each system into operational use, including minimizing time gaps between program phases.

3. Achieve the most cost-effective balance between acquisition and ownership costs and system effectiveness.

4. Correlate individual program decisions with the Planning, Programing, and Budgeting System (PPBS).

5. Maximize collaboration with United States allies.

6. Integrate support, manpower, and related concerns into the acquisition process.

D. POLICY

1. General. The provisions of this Directive and OMB Circular A-109 (enclosure 2) apply to the acquisition of major systems within the Department of Defense. The principles in this Directive should also be applied, where appropriate, to the acquisition of systems not designated as major. Responsibility for the management of system acquisition programs shall be decentralized to DoD Components except for the decisions retained by the Secretary of Defense.

2. Specific

a. Analysis of Mission Areas. As part of the routine planning for accomplishment of assigned missions, DoD Components shall conduct continuing analyses of their mission areas to identify deficiencies in capability or more effective means of performing assigned tasks. During these ongoing analyses, a deficiency or opportunity may be identified that could lead to initiation of a major system acquisition program.

b. Alternatives to New System Development. A system acquisition may result from an identified deficiency in an existing system, a decision to establish new capabilities in response to a technologically feasible opportunity, a significant opportunity to reduce the DoD cost of ownership, or in response to a new emphasis in defense. Development of a new system may be undertaken after assessment of alternative system concepts including:

(1) Change in United States or North Atlantic Treaty Organization (NATO) tactical or strategic doctrine.

(2) Use of existing military or commercial systems.

(3) Modification or product improvement of existing systems.

c. Designation of Major Systems. The Secretary of Defense shall designate those systems to be managed as major systems. Normally, this shall be done at the time the Mission Element Need Statement (MENS) is approved by the Secretary of Defense. In addition to the criteria set forth in OMB Circular A-109 (enclosure 2), the decision to designate any system as major may be based upon:

(1) Development risk, urgency of need, or other items of interest to the Secretary of Defense.

(2) Joint acquisition of a system by the Department of Defense and representatives of another nation or by two or more DoD Components.

(3) The estimated requirement for the system's research, development, test and evaluation (RDT&E), and procurement funds.

(4) The estimated requirement for manpower to operate, maintain and support the system in the field.

(5) Congressional interest.

d. Affordability. Affordability shall be considered at every milestone. At Milestone O, the order of magnitude of resources the DoD Component is willing to commit and the relative priority of the program to satisfy the need identified will be reconciled with overall capabilities, priorities, and resources. A program normally shall not proceed into Concept Exploration unless sufficient resources are or can be programed for Phase O. Approval to proceed into the Demonstration and Validation phase shall be dependent on DoD Component assurance that it plans to acquire and operate the system and that sufficient RDT&E resources are available or can be programed to complete development. Approval to proceed into the Full-Scale Development phase shall be dependent on DoD Component assurance that resources are available or can be programed to complete development and acquisition and to operate and support the deployed system in the manner prescribed by the Secretary of Defense. This assurance will be reaffirmed by the DoD Component prior to receiving approval to proceed into the Production and Deployment phase. Affordability, a function of cost, priority, and availability of fiscal and manpower resources, shall be established and reviewed in the context of the PPBS process. Specific facets of affordability to be reviewed at milestone decision points are set forth in DoD Instruction 5000.2 (reference (d)).

e. Acquisition Time. A primary objective of management shall be to minimize the time it takes to acquire materiel and facilities to satisfy military needs. Particular emphasis shall be placed on minimizing the time from a commitment to acquire an operable and supportable system to deploying it with the operating force. Commensurate with risk, such approaches as developing separate alternatives in high-risk areas, experimental prototypings of critical components, combining phases, or omitting phases should be explored. In those cases where combining or omitting phases are appropriate, authority shall be requested from the Secretary of Defense.

f. Tailoring. OSD and DoD Components shall exercise judgment and flexibility to encourage maximum tailoring in the acquisition process, as described in OMB Circular A-109 (enclosure 2), this Directive, and DoD Instruction 5000.2 (reference (d)), while stimulating a competitive environment. Tailoring of the acquisition process shall be documented in the MENS or the Decision Coordinating Paper. Approval of such tailoring shall be included in the Secretary of Defense Decision Memorandum.

g. Standardization and Interoperability

(1) Equipment procured for the use of personnel of the Armed Forces of the United States stationed in Europe under the terms of the North Atlantic Treaty should be standardized or at least be interoperable with equipment of other members of NATO. Accordingly, NATO rationalization, standardization, and interoperability (RSI) shall be basic considerations in acquisition of systems having a partial or total application to Europe. Refer to DoD Directive 2010.6 (reference (e)).

(2) Acquisition of equipment satisfying DoD Component needs should also include consideration of intraservice and interservice standardization and interoperability requirements.

h. Logistic Supportability. Logistic supportability shall be a design requirement as important as cost, schedule, and performance. A continuous interface between the program management office and the manpower and logistics communities shall be maintained throughout the acquisition process.

i. Directed Decisions by Higher Authority. When a line official above the program manager exercises decision authority on program matters, the decision shall be documented as official program direction to the program manager. The line official shall be held accountable for the decision.

3. Milestone Decisions and Phases of Activity. Four milestone decisions and four phases of activity comprise the normal DoD acquisition process for major systems.

a. Milestone 0 Decision. Approval of MENS and authorization to proceed into Phase 0--Concept Exploration--which includes solicitation, evaluation and competitive exploration of alternative system concepts. Approval to proceed with Concept Exploration also means that the Secretary of Defense intends to satisfy the need.

b. Milestone I Decision. Selection of alternatives and authorization to proceed into Phase I--Demonstration and Validation.

c. Milestone II Decision. Selection of alternative(s) and authorization to proceed into Phase II--Full-Scale Development--which includes limited production for operational test and evaluation. Approval to proceed with Full-Scale Development also means that the Secretary of Defense intends to deploy the system.

d. Milestone III Decision. Authorization to proceed into Phase III--Production and Deployment.

4. Documentation for Milestone Decisions

a. Milestone 0

Mission Element Need Statement (MENS). Each major system acquisition program requires a MENS approved by the Secretary of Defense. DoD Components shall prepare MENS to document major deficiencies in their ability to meet mission requirements. Joint MENS shall be prepared to document major deficiencies in two or more DoD Components. OSD and the OJCS may also prepare MENS in response to perceived mission area deficiencies. These MENS shall recommend a lead DoD Component to the Secretary of Defense. The MENS, as described in enclosure 2 to DoD Instruction 5000.2 (reference (d)), shall be limited to five pages, including annexes.

b. Milestones I, II, and III

(1) Decision Coordinating Paper (DCP). The DCP provides basic documentation for use by Defense Systems Acquisition Review Council (DSARC) members in arriving at a recommendation for the Secretary of Defense. It includes: a program description, revalidation of the mission need, goals and thresholds, a summary of the DoD Component's acquisition strategy (including a description of and tailoring of standard procedures), system and program alternatives, and issues affecting the decision. The DCP, as described in enclosure 3 to DoD Instruction 5000.2 (reference (d)), shall be limited to 10 pages, including annexes.

(2) Integrated Program Summary (IPS). The IPS summarizes the DoD Component's acquisition planning for the system's life-cycle and provides a management overview of the program. The IPS, as described in enclosure 4 to DoD Instruction 5000.2 (reference (d)), shall be limited to 60 pages, including all annexes except Annex B, Resources - Funding Profile.

(3) Milestone Reference File (MRF). The MRF shall be temporarily established within OSD to provide a central repository for existing program documentation and references for referral during each milestone review.

c. Milestones 0, I, II, and III

Secretary of Defense Decision Memorandum (SDDM). The SDDM documents each milestone decision, establishes program goals and thresholds, reaffirms established needs and program objectives, authorizes exceptions to acquisition policy (when appropriate), and provides the direction and guidance to OSD, OJCS, and the DoD Component for the next phase of acquisition.

E. RESPONSIBILITIES

1. The Defense Systems Acquisition Review Council (DSARC) shall advise the Secretary of Defense on milestone decisions for major systems and such other acquisition issues as the Defense Acquisition Executive determines to be necessary.

2. The Defense Acquisition Executive (DAE)

a. The DAE shall:

(1) Be the principal advisor and staff assistant to the Secretary of Defense for the acquisition of defense systems and equipment.

(2) Be designated by the Secretary of Defense and shall serve as the permanent member and Chairman of the DSARC.

(3) In coordination with the other permanent members of the DSARC:

(a) Integrate and unify the management process, policies, and procedures for defense system acquisition.

(b) Monitor DoD Component compliance with the policies and practices in OMB Circular A-109 (enclosure 2), this Directive, and DoD Instruction 5000.2 (reference (d)).

(c) Ensure that the requirements and viewpoints of the functional areas are given full consideration during staff and DSARC deliberations, and are integrated in the recommendations sent to the Secretary of Defense.

(d) Ensure consistency in applying the policies regarding NATO RSI for all major systems.

b. The DAE is specifically delegated authority to:

(1) Designate action officers who shall be responsible for the processing of the milestone documentation and who shall monitor the status of major systems in all phases of the acquisition process.

(2) Issue instructions and one-time, Directive-type memoranda in accordance with DoD Directive 5025.1 (reference (f)).

(3) Obtain such reports and information, consistent with the provisions of DoD Directive 5000.19 (reference (g)), as may be necessary in the performance of assigned functions.

3. The Under Secretary of Defense for Policy (USDP) shall be a permanent member of the DSARC. On occasion, the USDP may designate a representative to attend a given DSARC meeting.

4. The Under Secretary of Defense Research and Engineering (USDRE) is a permanent member of the DSARC and shall be responsible for policy and review of all research, engineering development, technology, test and evaluation, contracting, and production of systems covered by this Directive. On occasion, the USDRE may designate a representative to attend a given DSARC meeting. In addition, the USDRE shall:

a. Monitor, in conjunction with the Assistant Secretary of Defense (Program Analysis and Evaluation) (ASD(PA&E)), DoD Component procedures for analysis of mission areas.

b. Coordinate review of MENS provided by DoD Components.

c. Coordinate, together with Assistant Secretary of Defense (Comptroller) and ASD(PA&E), the interface of the acquisition process with the PPBS.

5. The Assistant Secretary of Defense (Manpower, Reserve Affairs, and Logistics) (ASD(MRA&L)) is a permanent member of the DSARC and shall be responsible for policy on logistic, energy, environment, safety, and manpower planning for new systems and for ensuring that logistic planning is consistent with system hardware parameters, logistic policies, and readiness objectives.

6. The Assistant Secretary of Defense (Comptroller) (ASD(C)) is a permanent member of the DSARC and shall coordinate, together with USDRE and ASD(PA&E), the interface of the acquisition process with the PPBS.

7. The Assistant Secretary of Defense (Program Analysis and Evaluation) (ASD(PA&E)) is a permanent member of the DSARC and shall:

a. Monitor, in conjunction with USDRE, DoD Component procedures for analysis of mission areas.

b. Evaluate cost-effectiveness studies prepared in support of milestone decisions for major system acquisition.

c. Coordinate, together with USDRE and ASD(C), the interface of the acquisition process with the PPBS.

8. The Chairman, Joint Chiefs of Staff (CJCS), or a representative designated by CJCS shall be a permanent member of the DSARC.

9. The principal advisors to the DSARC are listed in DoD Instruction 5000.2 (reference (d)).

10. The Head of Each DoD Component shall manage each major system acquisition assigned by the Secretary of Defense and shall establish clear lines of authority, responsibility, and accountability.

DoD Component Heads shall also:

a. Appoint a DoD Component acquisition executive to serve as the principal advisor and staff assistant to the Head of the DoD Component.

b. Establish a System Acquisition Review Council.

c. Ensure that a program manager is assigned and that a program manager's charter is approved as soon as feasible after Milestone O.

d. Establish career incentives to attract, retain, motivate and reward competent program managers.

e. Provide a program manager the necessary assistance to establish a strong program office with clearly established lines of authority and reporting channels between the program manager and the Head of the DoD Component. Where functional organizations exist to assist the program manager, the relationship of the functional areas to the program manager shall be established.

f. Monitor major system acquisitions to assure compliance with OMB Circular A-109 (enclosure 2), this Directive, and DoD Instruction 5000.2 (reference (d)).

11. The Program Manager shall acquire and field, in accordance with instructions from line authority, a cost-effective solution to the approved mission need that can be acquired, operated, and supported within the resources projected in the SDDM.

F. ORDER OF PRECEDENCE

This Directive and DoD Instruction 5000.2 (reference (d)) are first and second in order of precedence for major system acquisitions except where statutory requirements override. All DoD issuances shall be reviewed for conformity with this Directive or DoD Instruction 5000.2 (reference (d)) and shall be changed or canceled, as appropriate. Conflicts remaining after 90 days from issuance of this Directive shall be brought to the attention of the originating office and the DAE.

G. EFFECTIVE DATE AND IMPLEMENTATION

This Directive is effective immediately. Forward one copy of implementing documents to the Under Secretary of Defense for Research and Engineering within 120 days.

W. Graham Claytor, Jr.
W. Graham Claytor, Jr.
Deputy

Enclosures - 2
1. References
2. OMB Circular A-109, "Major System Acquisitions," April 5, 1976

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

April 5, 1976

(R) PROPOSED REVISIONS TO
CIRCULAR NO. A-109

TO THE HEADS OF EXECUTIVE DEPARTMENTS AND ESTABLISHMENTS

SUBJECT: Major System Acquisitions

1. Purpose. This Circular establishes policies, to be followed by executive branch agencies in the acquisition of major systems.

2. Background. The acquisition of major systems by the Federal Government constitutes one of the most crucial and expensive activities performed to meet national needs. Its impact is critical on technology, on the Nation's economic and fiscal policies, and on the accomplishment of Government agency missions in such fields as defense, space, energy and transportation. For a number of years, there has been deep concern over the effectiveness of the management of major system acquisitions. This Circular establishes approaches, decision milestones, and program phases which are considered appropriate for development and acquisition of major systems. However, it is recognized that flexibility is necessary in the acquisition process to accommodate varying national emergency and unique program situations. In such cases, the basis for deviations from the practices described herein will be reflected in the program acquisition atrategy and made visible throughout the planning and decision process. (R)

3. Responsibility. Each agency head has the responsibility to ensure that the intent of the provisions of this Circular are followed. This Circular provides administrative guidance to heads of agencies and does not establish and shall not be construed to create any substantive or procedural basis for any person to challenge any agency action or inaction on the basis that such action was not in accordance with this Circular. (R)

4. Coverage. This Circular covers and applies to:

a. Management of the acquisition of major systems, including: • Analysis of agency missions • Determination of mission needs • Setting of program objectives • Determination of system requirements • System program planning • Budgeting • Funding • Research • Engineering • Development • Testing and evaluation • Contracting • Production • Program and management control • Introduction of the system into use or otherwise successful achievement of program objectives.

b. All programs for the acquisition of major systems even though:

(1) The system is one-of-a-kind.

(2) The agency's involvement in the system is limited to the development of demonstration hardware for optional use by the private sector rather than for the agency's own use.

5. Definitions. As used in this Circular:

a. Executive agency (hereinafter referred to as agency) means an executive department, and an independent establishment within the meaning of sections 101 and 104(1), respectively, of Title 5, United States Code.

b. Agency component means a major organizational subdivision of an agency. For example: The Army, Navy, Air Force, and Defense Supply Agency are agency components of the Department of Defense. The Federal Aviation Administration, Urban Mass Transportation Administration, and the Federal Highway Administration are agency components of the Department of Transportation.

c. Agency missions means those responsibilities for meeting national needs assigned to a specific agency.

d. Mission need means a required capability within an agency's overall purpose, including cost and schedule considerations.

e. Program objectives means the capability, cost and schedule goals being sought by the system acquisition program in response to a mission need.

f. Program means an organized set of activities directed toward a common purpose, objective, or goal undertaken or proposed by an agency in order to carry out responsibilities assigned to it.

g. System design concept means an idea expressed in terms of general performance, capabilities, and characteristics of hardware and software oriented either to operate or to be operated as an integrated whole in meeting a mission need.

h. Major system means that combination of elements that will function together to produce the capabilities required to fulfill a mission need. The elements may include, for example, hardware, equipment, software, construction, or other improvements or real property. Major system acquisition programs are those programs that (1) are directed at and critical to fulfilling an agency mission, (2) entail the allocation of relatively large resources, and (3) warrant special management attention. Additional criteria and relative dollar thresholds for the determination of agency programs to be considered major systems under the purview of this Circular, may be established at the discretion of the agency head.

i. System acquisition process means the sequence of acquisition activities starting from the agency's reconciliation of its mission needs, with its capabilities, priorities and resources, and extending through the introduction of a system into operational use or the otherwise successful achievement of program objectives.

j. Life cycle cost means the sum total of the direct, indirect, recurring, nonrecurring, and other related costs incurred, or estimated to be incurred, in the design, development, production, operation, maintenance and support of a major system over its anticipated useful life span.

6. General policy. The policies of this Circular are designed to assure the effectiveness and efficiency of the process of acquiring major systems. They are based on the general policy that Federal agencies, when acquiring major systems, will:

a. Express needs and program objectives in mission terms and not equipment terms to encourage innovation and competition in creating, exploring, and developing alternative system design concepts.

b. Place emphasis in the initial activities of the system acquisition process on examination of improvements to existing systems to satisfy mission needs, and allow competitive exploration and comparison of alternative new system design concepts. ®

c. Communicate with Congress early in the system acquisition process by relating major system acquisition programs to agency mission needs. This communication should follow the requirements of Office of Management and Budget (OMB) Circular No. A-10 concerning information related to budget estimates and related materials.

d. Establish clear lines of authority, responsibility, and accountability for management of major system acquisition programs. Utilize appropriate managerial levels in decisionmaking, and obtain agency head approval at key decision points in the evolution of each acquisition program.

e. Designate a focal point responsible for integrating and unifying the system acquisition management process and monitoring policy implementation.

f. Rely on private industry in accordance with the policy established by OMB Circular No. A-76.

7. Major system acquisition management objectives. Each agency acquiring major systems should:

a. Ensure that each major system: Fulfills a mission need. Operates effectively in its intended environment. Demonstrates a level of performance and reliability that justifies the allocation of the Nation's limited resources for its acquisition and ownership.

b. Depend on, whenever economically beneficial, competition between similar or differing system design concepts throughout the entire acquisition process.

c. Ensure adequate risk assessment and appropriate trade-off among investment costs, ownership costs, schedules, and performance characteristics. (R)

d. Provide strong checks and balances by ensuring subsystem and system test and evaluation, as appropriate for the risks in the program. Plan and conduct only such tests as are necessary to verify system feasibility and performance. Such tests will be conducted jointly but may be evaluated independently by the developer and the user. (R)

e. Accomplish system acquisition planning, built on analysis of agency missions, which implies appropriate resource allocation resulting from clear articulation of agency mission needs.

f. Tailor a flexible acquisition strategy for each specific program, as soon as the agency decides to solicit alternative system design concepts, that could lead to the acquisition of a new major system and refine the strategy as the program proceeds through the acquisition process. Encompass test and evaluation criteria and business management considerations in the strategy. The strategy could typically include: • Use of the contracting process as an important tool in the acquisition program • Scheduling of essential elements of the acquisition process recognizing that the evenutal cost and utility of the system acquired will be influenced by either too aggressive or too slow a schedule • Demonstration, test, and evaluation criteria • Content of solicitations for proposals • Decisions on whom to solicit • Methods for obtaining and sustaining competition • Guidelines for the evaluation and acceptance or rejection of proposals • Goals for design-to-cost • Methods for projecting life cycle costs • Use of data rights • Use of warranties • Methods for analyzing and evaluating contractor and Government risks • Need for developing contractor incentives • Selection of the type of contract best suited for each stage in the acquisition process • Administration of contracts. (R)

g. Maintain a capability to: • Predict, review, assess, negotiate and monitor costs for system development, engineering, design, demonstration, test, production, operation and support (i.e., life cycle costs). Make provision for risk margins in all cost, schedule, and performance estimates to allow for resolution of unforeseen risks. • Assess acquisition cost, schedule and performance experience against predictions, and provide such assessments for consideration by the agency head at key decision points • Make new assessments where cost, schedule, or performance variances occur beyond the pre-planned tolerances. • Estimate life cycle costs during system design concept evaluation and selection, full-scale development, facility conversion, and production, to ensure appropriate trade-offs among investment costs, ownership costs, schedules, and performance • Use independent cost estimates, where feasible, for comparison purposes, and weigh them more heavily than contractor or agency estimates where the condition of competition or advocacy make that appropriate. (R)

8. Management structure.

a. The head of each agency that acquires major systems will designate an acquisition executive to integrate and unify the management process for the agency's major system acquisitions and to monitor implementation of the policies and practices set forth in this Circular.

b. Each agency that acquires--or is responsible for activities leading to the acquisition of--major systems will establish clear lines of authority, responsibility, and accountability for management of its major system acquisition programs.

c. Each agency should preclude management layering and placing nonessential reporting procedures and paperwork requirements on program managers and contractors.

d. A program manager will be designated for each of the agency's major system acquisition programs. This designation should be made when a decision is made to fulfill a mission need by pursuing either alternative system design concepts or a major change to an existing system. It is essential that the program manager have an understanding of user needs and constraints, familiarity with development principles, and requisite management skills and experience. Ideally, management skills and experience would include: • Research and development • Operations • Engineering • Construction • Testing • Contracting • Prototyping and fabrication of complex systems • Production • Business • Budgeting • Finance. With satisfactory performance, the tenure of the program manager should be long enough to provide continuity and personal accountability. ®

e. Upon designation, the program manager should be given budget guidance and a written charter of his authority, responsibility, and accountability for accomplishing approved program objectives.

f. Agency technical management and Government laboratories should be considered for participation in agency mission analysis, evaluation of alternative system design concepts, and support of all development, test, and evaluation efforts.

g. Agencies are encouraged to work with each other to foster technology transfer, prevent unwarranted duplication of technological efforts, reduce system costs, promote standardization, and help create and maintain a competitive environment for an acquisition.

9. Key decisions. Technical and program decisions normally will be made at the level of the agency component or operating activity. Normally, each system acquisition program will require the following first four key decisions, authority for which should be retained by the agency head. The fifth decision is retained by the agency head in case of unforeseen events and program perturbations: ®

a. Identification and definition of a specific mission need to be fulfilled, the relative priority assigned within the agency, the range of competitive system concepts to be explored, the general constraints within which a solution is sought, and the general magnitude of resources that may be invested. Ⓡ

b. Selection of a chosen design concept to be developed, or competitive system design concepts to be demonstrated and tested. Ⓡ

c. Commitment of a system program to (1) full-scale development only, or (2) to full-scale development, production, and deployment. Ⓡ

d. Commitment of a system program to production/deployment. Ⓡ

e. Immediately delay or stop any program determined to be in trouble due to unforeseen events or where pre-determined tolerances for cost, schedule, or performance estimates have been exceeded. Ⓡ

10. Determination of mission needs.

a. Determination of mission need should be based on an analysis of an agency's mission reconciled with overall capabilities, priorities and resources. When analysis of an agency's mission shows that a need for a new major system exists, such a need should not be defined in equipment terms, but should be defined in terms of the mission, purpose, capability, agency components involved, schedule and cost objectives, and operating constraints. A mission need may result from a deficiency in existing agency capabilities or the decision to establish new capabilities in response to a technologically feasible opportunity. Mission needs are independent of any particular system or technological solution.

b. Where an agency has more than one component involved, the agency will assign the roles and responsibilities of each component at the time of the first key decision. The agency may permit two or more agency components to sponsor competitive system design concepts in order to foster innovation and competition.

c. Agencies should, as required to satisfy mission responsibilities, contribute to the technology base, effectively utilizing both the private sector and Government laboratories and in-house technical centers, by conducting, supporting, or sponsoring: • Research • System design concept studies • Proof of concept work • Exploratory subsystem development • Tests and evaluations. Applied technology efforts oriented to system developments should be performed in response to approved mission needs.

11. Alternative systems.

a. Alternative system design concepts will be explored within the context of the agency's mission need and program objectives--with emphasis on generating innovation and conceptual competition from industry. Benefits to be derived should be optimized by competitive exploration of alternative system design concepts, and trade-offs of capability, schedule, and cost. Care should be exercised during the initial steps of the acquisition process to include the exploration and comparison of the full potential of improvements to existing systems as well as new system design concepts to satisfy mission needs. However, mission needs or program objectives should not conform to known systems or products that might foreclose consideration of alternatives. (R)

b. Alternative system design concepts will be solicited from a broad base of qualified firms. In order to achieve the most preferred system solution, emphasis will be placed on innovation and competition. To this end, participation of smaller and newer businesses should be encouraged. Concepts will be primarily solicited from private industry; and when beneficial to the Government, foreign technology, and equipment may be considered.

c. Federal laboratories, federally funded research and development centers, educational institutions, and other not-for-profit organizations may also be considered as sources for competitive system design concepts. Ideas, concepts, or technology, developed by Government laboratories or at Government expense, may be made available to private industry through the procurement process or through other established procedures. Industry proposals may be made on the basis of these ideas, concepts, and technology or on the basis of feasible alternatives which the proposer considers superior.

d. Research and development efforts should emphasize early competitive exploration of alternatives, as relatively inexpensive insurance against premature or preordained choice of a system that may prove to be either more costly or less effective.

e. Requests for alternative system design concept proposals will explain the mission need, schedule, cost, capability objectives, and operating constraints. Each offeror will be free to propose his own technical approach, main design features, subsystems, and alternatives to schedule, cost, and capability goals. In the conceptual and less than full-scale development stages, contractors should not be restricted by detailed Government specifications and standards.

f. Selections from competing system design concept proposals will be based on a review by a team of experts, preferably from inside and outside the responsible component development organization. Such a review will consider: (1) Proposed system functional and performance capabilities to meet mission needs and program objectives, including resources required and benefits to be derived by trade-offs, where feasible, among technical performance, acquisition costs, ownership costs, time to develop and procure; and (2) The relevant accomplishment record of competitors.

g. During the uncertain period of identifying and exploring alternative system design concepts, contracts covering relatively short time periods at planned dollar levels will be used. Timely technical reviews of alternative system design concepts will be made to effect the orderly elimination of those least attractive.

h. Contractors should be provided with operational test conditions, mission performance criteria, and life cycle cost factors that will be used by the agency in the evaluation and selection of the system(s) for full-scale development and production. Contractors should be given the flexibility to offer testing, system performance, and cost options (backed by adequate substantiating trade study results) for full-scale development which offer the potential of reduced overall program cost and/or accelerated system deployment. (R)

i. The participating contractors should be provided with relevant operational and support experience through the program manager, as necessary, in developing performance and other requirements for each alternative system design concept as tests and trade-offs are made.

j. Development of subsystems that are intended to be included in a major system acquisition program will be restricted to less than fully designed hardware (full-scale development) until the subsystem is identified as a part of a system candidate for full-scale development. Exceptions may be authorized by the agency head if the subsystems are long lead time items that fulfill a recognized generic need or if they have a high potential for common use among several existing or future systems.

12. Demonstrations.

a. Advancement to a competitive test/demonstration phase may be approved only when the agency's mission need and program objectives are reaffirmed and it can be shown that a competitive test/demonstration phase is required before concept selection can be made. Ⓡ

b. Where the need for a competitive test/demonstration phase has been substantiated, the agency head will authorize the phase to proceed. Major system acquisition programs will be structured and resources planned to demonstrate and evaluate competing alternative system design concepts that have been selected. Ⓡ

c. Development of a single system design concept that has not been competitively selected should be considered only if justified by factors such as urgency of need, or by the physical and financial impracticality of demonstrating alternatives. Proceeding with the development of a noncompetitive (single concept) system may be authorized by the agency head. Strong agency program management and technical direction should be used for systems that have been neither competitively selected nor demonstrated.

13. Full-scale development and production.

a. Full-scale development, production, and deployment may be approved when the agency's mission need and program objectives are reaffirmed and results verify that the chosen system design concept is sound. Ⓡ

b. Production and deployment may proceed following full-scale engineering development in those cases where development test and analysis results verify a system design which will satisfy the need in an operational environment. In those cases, a production schedule will be established with the initial production rate lower than the expected peak rate, and formal operational test and evaluation may take place concurrently with initial production. Ⓡ

c. Selection of a system(s) and contractor(s) for full-scale development and production is to be made on the basis of (1) system performance measured against current mission need and program objectives, (2) an evaluation of estimated acquisition and ownership costs, and (3) such factors as contractor(s) demonstrated management, financial, and technical capabilities to meet program objectives.

d. The program manager will monitor system tests and contractor progress in fulfilling system performance, cost, and schedule commitments. Significant actual or forecast variances will be brought to the attention of the appropriate management authority for corrective action.

14. Budgeting and financing. Beginning with FY 1979 all agencies will, as part of the budget process, present budgets in terms of agency missions in consonance with Section 201(i) of the Budget and Accounting Act, 1921, as added by Section 601 of the Congressional Budget Act of 1974, and in accordance with OMB Circular A-11. In so doing, the agencies are desired to separately identify research and development funding for: (1) The general technology base in support of the agency's overall missions, (2) The specific development efforts in support of alternative system design concepts to accomplish each mission need, and (3) Full-scale developments. Each agency should ensure that research and development is not undesirably duplicated across its missions.

15. Information to Congress.

a. Procedures for this purpose will be developed in conjunction with the Office of Management and Budget and the various committees of Congress having oversight responsibility for agency activities. Beginning with FY 1979 budget each agency will inform Congress in the normal budget process about agency missions, capabilities, deficiencies, and needs and objectives related to acquisition programs, in consonance with Section 601(i) of the Congressional Budget Act of 1974.

b. Disclosure of the basis for an agency decision to proceed with a single system design concept without competitive selection and demonstration will be made to the congressional authorization and appropriation committees.

16. Implementation. All agencies will work closely with the Office of Management and Budget in resolving all implementation problems.

17. Submissions to Office of Management and Budget. Agencies will submit the following to OMB:

a. Policy directives, regulations, and guidelines as they are issued.

b. Within six months after the date of this Circular, a time-phased action plan for meeting the requirements of this Circular.

c. Periodically, the agency approved exceptions permitted under the provisions of this Circular.

This information will be used by the OMB, in identifying major system acquisition trends and in monitoring implementations of this policy.

18. Inquiries. All questions or inquiries should be submitted to the OMB, Administrator for Federal Procurement Policy. Telephone number, area code, 202-395-4677.

HUGH E. WITT
ADMINISTRATOR FOR
FEDERAL PROCUREMENT POLICY

Approved:

JAMES T. LYNN
DIRECTOR

(No. A-109)

GENERAL DYNAMICS F-16 CONTRACTORS

ABEX CORP.
Oxnard, CA

hydrauli: pumps

AERONONIC CORP.
Clearwater, FL

mechanical clock (airspeed mach indicatro; vertical velocity indicator; pressure compartment altimeter

AEROQUIP CORP.
Jackson, MI

couplings; coupling ring 38 deg. V-band

AEROSPACE AVIONICS
Bohemia, NY

inverter

AEROSPACE OPTICS INC.
Fort Worth, TX

stores control panel

AIRCRAFT HYDRO-FORMING
Gardena, CA

bomb ejector rack

AIRCRAFT POROUS MEDIA
Glen Cove, NY

hydraulic fuel filters; drain case filter

ALCOA
Davenport, IA.

Aluminum

ALLEN AIRCRAFT PRODUCTS
Ravenna, OH

hydraulic res. bleed valve

ALLEN, R.C.
Grand Rapids, MI

rate gyro transmitter

ANDREA RADIO CORP.
Long Island City, LI, NY

intercommunication system (c)

ARKWIN INDUSTRIES
Westbury, NY

speed brake door actuator; hydraulic main landing gear uplock actuator; actuator, MLG door; actuator, LMG retract/extend

ASTRONAUTICS CORP. OF AMERICA
Milwaukee, WI

horizontal situation indicator; attitude director indicator

AVNET
Hamilton/Avnet Electronics Div.
Culver City, CA

cabin temperature sensor

BELL AEROSPACE TEXTRON
Dalmo Victor Operations
Belmont, CA

AN/ALR-69 threat warning system

BELL AEROSPACE TEXTRON
Dalmo Victor Operations
Belmont, CA

Compass Sail

BRUNSWICK CORP.
Marion, VA

nose radome

COLLINS, G.L., CORP.
Long Beach, CA

transducers

COLT INDUSTRIES
Chandler Evans Inc.
Control Systems Div.
West Hartford, CT

major engine fuel pump; valve assembly cooling oil by-pass, cartridge assemblies

CONRAC CORP.
West Caldwell, NJ

signal data recorder

CONSOLIDATED CONTROLS CORP.
Bethel, CT

pressure switch; switch hydraulic low pump pass; switch & receptacle

CONTROLEX CORP. OF AMERICA
Croton Falls, NY

assembly, throttle rack

COURTER INC.
Boyne City, MI

pressure hydraulic indicator; pressure hydraulic transmitter (c)

DOWTY ROTOL
Sterling, VA

fuel flow proportioner

DUCOMMUN
Dallas, TX

alluminum

DYNAMIC CONTROLS
South Windsor, CT

gun control unit

ELDEC CORP.
West Lynwood, WA

power supplies

EXPLOSIVE TECHNOLOGY
Fairfield, CA

canopy jettison pyrotechnics

FAIRCHILD CAMERA AND INSTRUMENT CORP.
Syosset, NY

cockpit television sensors

FAIRCHILD INDUSTRIES
Stratos Div.
Manhattan Beach, CA

hot temperature control sensor

FRAM CORP.
Tulsa, OK

filter

GARRETT CORP.
AiResearch Manufacturing Co.
Phoenix, AZ

jet fuel starter

GARRETT CORP.
Rexdale, Ontario Canada

temperature control system

GARRETT CORP.
AiResearch Manufacturing Co.
Torrance, CA

primary/secondary heat exchanger, regenerative heat exchanger, leading edge flap drive system, emergency power unit, pneumatic sensor

GENERAL DYNAMICS F-16 CONTRACTORS, Page 2

GATES LEARJET CORP.
Jet Electronics & Technology
Grand Rapids, MI

standby attitude indicator

GENERAL DYNAMICS CORP.
Convair Div.
San Diego, CA

TACAN

GENERAL DYNAMICS CORP.
Electronics Div.
San Diego, CA

avionics intermediate shop

GENERAL ELECTRIC CO.
Aerospace Control Systems Dept.
Binghamton, NY

gyros, accelerometers, integrated servo actuator

GENERAL ELECTRIC CO.
Armament Systems Dept.
Burlington, VT

ammo handling/loading systems

GENERAL MOTORS CORP.
Delco Electronics Div.
Goleta, CA

fire control computer

GOODRICH, B.F. CO.
Akron, OH

canopy seal; tires (GFE)

GOODYEAR AEROSPACE CORP.
Akron, OH

wheels and brakes

GOODYEAR AEROSPACE CORP.
Litchfield Park, AZ

transparent canopy

TE SYLVANIA
lectronic Systems & Services Div.
edham Heights, MA

VHF communications

LL AIRBORNE INSTRUMENTS
ithtown, LI, NY

tachometer, temperature, angle-of-attack and nozzle position indicators; ejector pump

ELTINT CORP.
een Lawn, LI, NY

IFF

HONEYWELL INC.
Avionics Div.
Minneapolis, MI

HUD rate sensor units

HUCK MANUFACTURING CO.
Detroit, MI

hardware

HUGHES AIRCRAFT
Culver City, CA

LAU-88 launcher

INTERNATIONAL HARVESTER CORP.
Solar Div.
San Diego, CA

T62-40-8 turbines

INTERNATIONAL TELEPHONE & TELEGRAPH
J.C. Carter Div.
Costa Mesa, CA

remote sensing relief valve, fuel pressure cap, fuel pressure adapter, filter disconnect, flow proportioner

ITEK CORP.
Applied Technology Div.
Palo Alto, CA

AN/ALR-46/49 radar warning and power management

ITEK CORP.
Applied Technology Div.
Sunnyvale, CA

threat warning system

JORGENSON, EARLE M.
Dallas, TX

steel

KAISER AEROSPACE & ELECTRONICS CORP.
Electronics Div.
Palo Alto, CA

radar EO display

KAISER CORP.
Ravenswood, WV

aluminum

KEARFLEX ENGINEERING CO.
Cranston, RI

pressure compartment altimeter

KIDDE, WALTER, & CO.
Fenwal Div.
Ashland, MA

fire detection element, ice detection element, fire detection control, overheat element, control

LATROBE STEEL CORP.
Latrobe, PA

steel

LEAR SIEGLER
Power Equipment Div.
Maple Heights, OH

5 kva generator

LEAR SIEGLER
Astronics Div.
Santa Monica, CA

flight control computer

LITTON INDUSTRIES
Clifton Precision Div.
Clifton Heights, PA

attitude indicator, horizontal situation indicator, angle of attack indicator, nozzle position indicator, mode select

LITTON INDUSTRIES
Guidance & Control Systems Div.
Woodland Hills, CA

fire control computer

MAGNAVOX GOVERNMENT & INDUSTRIAL ELECTRONICS CO.
Fort Wayne, IN

secure voice system, UHF communications, AN/ARC-164 radio, channel frequency indicator

MARATHON BATTERY CO.
Waco, TX

sealed cell storage battery

MARCONI AVIONICS LTD.
Airborne Display Div.
Rochester, Kent England

HUD

MARTIN-MARIETTA AEROSPACE
Orlando, FL

support equipment, LANTIRN development

MCDONNELL DOUGLAS CORP.
Long Beach, CA

high technology seat

MENASCO
Ft. Worth, TX

main, nose gear; nose gear steering system

MIDLAND ROSS CORP.
Grimes Div.
Urbana, OH

angle of attack indexer

NORTHROP CORP.
Precision Products Div.
Norwood, MA

gyros

NOVATRONICS
Pompano Beach, CA

interference blanker

OEA
Des Plaines, IL

rocket, canopy

PARKER HANNIFIN CORP.
Aerospace Hydraulic Div.
Irvine, CA

water drain valve, main landing gear door actuator, accumulators, resevoirs, leading edge shut-off valve

PHOTO-SONICS
Burbank, CA

film magazine camera; camera body

PNEUDRAULICS,
Montclair, CA

gun port valve; valve, hydraulic relief

PNEUMO CORP.
National Water Lift Co. Div.
Kalamazoo, MI

integrated servo actuators

ROBERTSHAW
Anaheim, CA

oxygen regulator

ROCKWELL INTERNATIONAL CORP.
Collins Government Avionics Div.
Cedar Rapids, IA

AN/ARN-108 ILS receiver

ROSEMOUNT
Minneapolis, MN

total temperature probe; pneumatic sensor assembly; compensate tube assembly; probe

SARGENT-FLETCHER CO.
El Monte, CA

370 gal. fuel tanks

SCI SYSTEM
Huntsville, AL

instruments inertial reference system interface units

SIERRACIN CORP.
Sylmar, CA

transparent canopy

SIMMONDS PRECISION PRODUCTS
Instruments Systems Div.
Vergennes, VT

fuel quantity measuring system, canopy actuator, fuel level sensing set

SINGER CO.
Link Div.
Binghampton, NY

operational flight trainer/simulator

SINGER CO.
Kearfott Div.
Little Falls, NJ

inertial navigation set (SKN-2416)

SOLAR TURBINES INTERNATIONAL
Radial Engine Div.
San Diego, CA

T-62T-40-8 APU

SPERRY CORP.
Avionics Div.
Phoenix, AZ

digital air data computer

STANDARD-THOMPSON CORP.
Waltham, MA

LOX heat exchanger; fuel/oil heat exchanger

STERER ENGINEERING & MANUFACTURING CO.
Los Angeles, CA

flow limit valve; hydraulic solenoid valve; hydraulic bypass valve; LG select valve; valve, NIC sequences mech. operated

SUNDSTRAND CORP.
Sundstrand Aviation
Rockford, IL

APU; starter/gearbox; constant speed drive

SYSTRON-DONNER CORP.
Inertial Div.
Concord, CA

accelerometers

TALLEY CORP.
Newbury Park, CA

F-16B canopy actuator

TALLEY INDUSTRIES
Stencel Aero Engineering Corp.
Asheville, NC

ejection seats

TALLEY INDUSTRIES
Electrodynamics Div.
Rolling Meadows, IL

accelerameters

TELEDYNE
Teledyne Avionics
Charlottsville, VA

angle of attack transmitter

TELEDYNE
Teledyne Hydra-Power
New Rochelle, NY

brake control speed valve

TELEDYNE
Teledyne Electronics
Newbury Park, CA

AN/APX-101 transponder

TENSOLITE
Buchanan, NY

wire

TEXSTAR CORP.
Texstar Plastics Div.
Grand Prairie, TX

canopy transparencies

TRACOR
Autin, TX

AN/ALE-40 chaff/flare dispenser

TRANSCO PRODUCTS
Venice, CA

threat warning and beacon antennas; UHF/L-band antenna; TACAN L-band antenna

TRW
Equipment Group
Cleveland, OH

fuel booster pump

UNITED AIRCRAFT PRODUCTS
Dayton, OH

heat exchanger

UNITED TECHNOLOGIES CORP.
Pratt & Whitney Aircraft Group
Hartford, CT

F100-PW-100 engine

UNITED TECHNOLOGIES CORP.
Hamilton-Standard Div.
Windsor Locks, CT

water separator anti-ice control set; turbine compressor; air cooling turbine; heat exchangers

WAGNER ELECTRIC CORP.
Bloomfield, NJ

28V converter

WALTHAM PRECISION INSTRUMENTS
Waltham, MA

mechanical clock

WESTERN HYDRAULICS
Anaheim, CA

speed brake actuators

WESTINGHOUSE ELECTRIC CO.
Aerospace Div.
Baltimore, MD

AN/ALQ-131 ECM pods, AN/APG-66 radar

WESTINGHOUSE ELECTRIC CO.
Aerospace Electrical Div.
Lima, OH

60 kva generator, transformers

WHITTAKER CORP.
Whittaker Controls Div.
North Hollywood, CA

hydraulic valves and regulators

GENERAL DYNAMICS F-16

OVERSEAS CONTRACTORS

BELGIUM

ATELIERS DE CONSTRUCTIONS
Electriques De Charleroi (ACEC) SA
Charleroi, Belgium

low-power radio-frequency units; radar

FABRIQUE NATIONALE HERSTAL S.A.
Herstal-lez-Lieges, Belgium

inlet/fan modules, gas generator for F100 engine, final test and assembly

FAIREY, SA
Gosselier, Belgium

aft fuselage, wing box structures, vertical stabilizer parts, engine and nose-landing gear build-up work assembly

MBLE SA
Brussels, Belgium

digital signal processor and radar computer

SIEMENS SA
Oostkamp, Belgium

radar power supplies

SOCIETE ANONYME DE CONSTRUCTIONS
AERONAUTIQUE (SABACA) SA
Brussels, Belgium

wing box and aircraft assembly

DENMARK

BURMEISTER & WAIN
Lystrup, Denmark

phuematic sensor, flight control computer, radar control panel, ice detector

DANNEBORG ELEKTRONIK
Lystrup, Denmark
Horsens, Denmark

flight control computer components (sub to Lear Siegler)

DANSK INDUSTRI SYNDIKAT (DISA)
Skovlunde, Denmark

flare/chaff dispenser (sub to Tracor); gear boxes (sub to P&W); F-100 main engine module emergency power unit, engine starting system, door actuators

JORGEN HOYER AS
Veksoe, Denmark

leading edge flap drive

NEA-LINDBERG AS
Ballerup, Denmark

radar/antenna

RADARTRONICS
Ballerup, Denmark

channel frequency indicator, 40 kva geneator

CHR. ROVSING AS & NESELCO
Herlev, Denmark

fire control computer

PER UDSEN
Grennaa, Denmark

vertical fin box assemblies, fuel & weapon pylons

SILCON
Koeding, Denmark

inverter

STANDARD ELECTRIC
Horsens, Denmark

trim panels; flight control panels; electronic component assemblies

J.H. QUITZAN AS
Sonderborg, Denmark

environmental unit heat exchanges

NETHERLANDS

DAF TRUCKS
Eindhoven, The Netherlands

landing gear

FOKKER/VFW
Amsterdam, The Netherlands

center fuselage and wing components, final assembly

HOLLANDSE SIGNAALAPPARATEN
Hengelo, The Netherlands

radar antenna

OPTISCHE INDUSTRIE de OUDE DELFT (OLDELFT)
Delft, The Netherlands

HUD pilot display unit

PHILIPS GLOEILAMPENFABRIEKEN
Eindhoven, The Netherlands

F100 engine augmentor & exhaust module

SIMMONDS N.V.
Brummen, The Netherlands

fuel quantity measuring system

VAN DOORNE'S BEDRIJTSWAGENFABRIEK
Eindhoven, The Netherlands

landing gear

NORWAY

KONGSBERG VAPENFABRIKK
Kongsberg, Norway

brakes and anti-skid system; fan-drive turbine modules for F100 engine; turbine compressors; inertial navigation system components (sub to Singer/Kearfott)

NERA
Bergen Div.
Bergen, Norway

threat warning system, radar racks

NORDEN PLAST
Drammen, Norway

ammo handling system

A/S NORDISK ALUMINUMINDUSTRI HOYANG
Holmestrand, Norway

370 gal external fuel tanks

NTP
Fredrikstad, Norway

ammo handling system

RAUFOSS AMMUNISIJONSFABRIKKER A/S
Raufoss, Norway

wheels; ammo handling system

GUSTAV A. RING A/S
Oslo, Norway

interference blanker

SPERRY-VICKERS
Ski, Norway

ammo handling system

STANDARD TELEFON OG
Kabelfabrik A/S
Oslo, Norway

air-to-ground IFF; CADC

UNITED KINGDOM

MARCONI AVIONICS LTD.
Rochester, Kent, England

HUD prime

PILKINGTON PE
Sta Asaphn, Clwyd, Wales

optical modules

GENERAL DYNAMICS F-16

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FAIREY, SA
Gosselies, Belgium

aft fuselage, wing box structures, vertical stabilizer parts, engine and nose-landing gear build-up work assembly

MBLE SA
Brussels, Belgium

digital signal processor and radar computer

SIEMENS SA
Oostkamp, Belgium

radar power supplies

SOCIETE ANONYME DE CONSTRUCTIONS
AERONAUTIQUE (SABACA) SA
Brussels, Belgium

wing box and aircraft assembly

DENMARK

DANNEBORG ELEKTRONIK
Lystrup, Denmark
Horsens, Denmark

flight control computer components (sub to Lear Siegler)

DANSK INDUSTRI SYNDIKAT (DISA)
Skovlunde, Denmark

flare/chaff dispenser (sub to Tracor); gear boxes (sub to P&W); F-100 main engine module emergency power unit, engine starting system, door actuators

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Veksoe, Denmark

leading edge flap drive

NEA-LINDBERG AS
Ballerup, Denmark

radar/antenna

RADARTRONICS
Ballerup, Denmark

channel frequency indicator

CHR. ROVSING AS & NESELCO
Herlev, Denmark

fire control computer

PER UDSEN
Grennaa, Denmark

vertical fin box assemblies, fuel & weapon pylons

SILCON
Koeding, Denmark

inverter

STANDARD ELECTRIC
Horsens, Denmark

trim panels; flight control panels; electronic component assemblies

J.H. QUITZAN AS
Sonderborg, Denmark

environmental unit heat exchanges

NETHERLANDS

DAF TRUCKS
Eindhoven, The Netherlands

landing gear

FOKKER/VFW
Amsterdam, The Netherlands

center fuselage and wing components, final assembly

N.V. HOLLANDSE SIGNAALAPPARATEN
Hengelo, The Netherlands

HUD

N.V. PHILIPS GJOEILAMPENFABRIEKEN
Eindhoven, The Netherlands

F100 engine augmentor & exhaust module

SIMMONDS N.V.
Brummen, The Netherlands

fuel quantity measuring system

VAN DOORNE'S BEDRIJTSWAGENFABRIEK
Eindhoven, The Netherlands

landing gear

NORWAY

KONGSBERG VAPENFABRIKK
Kongsberg, Norway

brakes and anti-skid system; fan-drive turbine modules for F100 engine; turbine compressors; inertial navigation system components (sub to Singer/Kearfott)

NERA
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Bergen, Norway

threat warning system, radar racks

NORCEN PLAST
Drammen, Norway

ammo handling system

A/S NORDISK ALUMINUMINDUSTRI HOYANG
Holmestrand, Norway

370 gal external fuel tanks

NTP
Fredrikstad, Norway

ammo handling system

RAUFOSS AMMUNISIJONSFABRIKKER A/S
Raufoss, Norway

wheels; ammo handling system

CUSTAV A. RING A/S
Oslo, Norway

interference blanker

SPERRY-VICKERS
Ski, Norway

ammo handling system

STANDARD TELEFON OG
Kabelfabrik A/S
Oslo, Norway

air-to-ground IFF; CADC

UNITED KINGDOM

MARCONI AVIONICS LTD.
Rochester, Kent, England

HUD prime

PILKINGTON PE
Sta Asaphn, Clwyd, Wales

optical modules

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